COMMON DISEASES

WOODS HUTCHINSON

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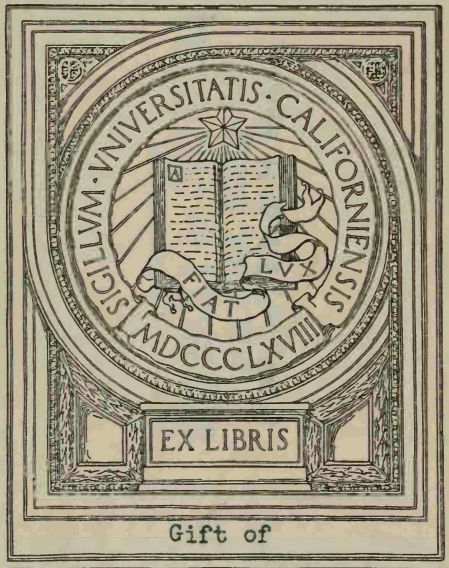

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COMMON DISEASES.
A HAND-BOOK OF HEALTH. Illustrated.
THE CONQUEST OF CONSUMPTION. Illustrated.
PREVENTABLE DISEASES.

HOUGHTON MIFFLIN COMPANY
BOSTON AND NEW YORK

COMMON DISEASES

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BY

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BOSTON AND NEW YORK
HOUGHTON MIFFLIN COMPANY
The Riverside Press Cambridge
1913

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Published March 1913

RC48
H97
1913

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CHAPTER I

THE PASSING OF PILLS AND POWDERS

WHEN Eve ate the apple she was making an experiment in therapeutics. In this she was only living up to the professional obligations of her sex, probably with an eye to its use upon Cain and Abel in the next domestic emergency. Even the misogynist Moses admits that it was because the fruit was "to be desired to make one wise."

To this day the serpent is the symbol of medicine, of wisdom, and of Woman the Wise and the Inscrutable, She-Who-Must-Be-Obeyed. Woman is the oldest and not least worthy priest of Æsculapius, an echo of which still rings in the old proverb, "One old woman is worth a dozen doctors."

When the good old mother in Israel trumpets her contempt for the medical profession with its "new-fangled fixin's," she has a past of a quarter of a million years to base her pretensions upon.

The drug problem, the burning question both before and after taking, "What shall I take?" is one of the oldest in history. Even older, and far more respectable, than its sister query, "What will *you* take?" Though the answer was the same Life-Saving Remedy in the vast majority of both cases.

Woman was the earliest doctor, alcohol the first patent medicine, as also the last; hence, perhaps, the antipathy between the sex and the drug.

Nowadays we are inclined, not unnaturally, to associate drugs with the doctor; but as a matter of historic, or rather pre-historic, fact they are far older than he is. They were staples of household use administered by the Wise Woman long before he was invented.

Our *materia medica*, our stock of known remedies, has been built up and tested and weeded out by the slow, painful experimentation of the whole human race extending over thousands of years.

No better, more vivid illustration of the Darwinian method of progress, of the survival of the fittest, of wisdom slowly growing by bitter experience of repeatedly doing the wrong thing, could be found than our growth in the knowledge of therapeutics, of the Art of Healing. Indeed, only from an evolutionary point of view can we consider it tolerantly and justly, with sympathy for human error and pity for its mistakes, and little inclination to hold any individual or class solely, or even chiefly, responsible for them. Doctor and patient alike are to be pitied rather than blamed for their costly errors and terribly punished mistakes in the long fight against ignorance, disease, and superstition.

The mode of discovery of drugs was probably somewhat in this wise. In his eager, unceasing, omnivorous search for anything that would add attractiveness to his menu in times of plenty, or stay his hunger in famine, primitive man unquestionably bit off, chewed,

and endeavored to digest almost every berry, plant, root, or leaf which grew out of doors in the region in which he lived — just as his twentieth-century avatar, the two-year-old toddler, will to this day, if his designs are not frustrated by the watchful eye of his mother or nurse. Anything within reach of his chubby clutch which is not too heavy for him to lift and whose narrowest presenting diameter is not in excess of the widest possible distention of his rosy mouth, goes into it and will be swallowed if possible.

Some of these near-foods were so prickly or so bitter that they were promptly spit out without being swallowed; others so dry and tasteless as to be worthless — except as breakfast foods. Others could be swallowed, but would n't stay down, and these became emetics and were advanced at once to a place of honor on the primitive medicine shelf. Others showed astonishing ingenuity in escaping from the body by another route, and became purges and cathartics.

The seed capsules of a certain poppy which looked plump and nutritious were found, when chewed, to produce delightful sensations of drowsiness and comfort, followed by golden dreams and purple visions ending in deep and profound sleep; and opium, the Pain-Conqueror, long hailed as the choicest gift of the gods to man, was discovered. Of course, it was early found that if you chewed too large a poppy head you might still get the drowsy comfort and rosy dreams — but you did n't come back to tell about them; and this introduced such refinements as dosage in proportion to effects desired.

Another herb of intensely bitter taste, though unattractive as a comestible, would make the muscles jump under your skin like grasshoppers, and your jaws snap together like a steel trap; while in larger amounts it produced swift and unpleasant death, with all external appearances of extreme discomfort. This was laid aside to be rubbed on arrow tips, or served cold to your enemy for breakfast; and, of course, it soon climbed up on the medicine shelf, under the name of strychnine, apparently on the principle that what would kill you in large doses must be peculiarly good for you in small ones. Or perhaps it was found useful, in the language of the ancient legend, in "throwing patients into fits," which could then be cured by incantations, providing you had guessed your doses correctly.

Yet another of these trial desserts, the thorn apple, our familiar "Jimson weed," was found, when eaten, to give an excellent imitation of insanity, with delusions and ravings; of course a drug which would produce such astonishing effects as this upon a well man must do wonders for a sick one, and its family was promptly raised to the medicine shelf (by a sort of prophetic homeopathy) as a cure for mental derangements, under the name of *hyoscyamus*, where it remains to this day.

Some greedy plutocrat of the Pliocene having one day gathered in a gourd more ripe berries than he could possibly eat, left the crushed surplus standing where the sun could get at them. His hunger returning in a day or two, he came back to finish them; but to his

surprise found them turned into a biting, frothy pulp, covered with rosy bubbles. He gulped it down, and in a few minutes began to see things about him as he never had seen them before, and Other Things that he had never even dreamed of. Even when he woke up with a headache his dreams came back to him in alluring guise, and by the time he had got the dark-brown taste out of his mouth, he decided that the game was worth another trial, and hastened to pick a bigger gourdful of berries and set it to brew. Thus alcohol, the Great Magician, with the sting in his tail, was born, and adopted as Big Medicine.

The discovery of most of our standard drugs goes back beyond the dawn of history. We know no more when opium was first used than we know when, or where, wheat or maize was first used. History is either absolutely silent, or full of fairy tales to the effect that these blessings and curses alike were invented by some god-man, or even brought down bodily, like fire, from heaven. Certain it is that there was a full medicine chest of drugs before the doctor, or anything approaching him, was invented.

At last the doctor comes on the stage of history in the guise of that strange functionary, the *shaman*, or Medicine Man, part priest, part doctor, part astrologer-scientist, and the common ancestor of all three; which is one of the reasons why science, medicine, and religion "scrap" so enthusiastically whenever they come together — it's a family affair. Healing becomes a professional instead of amateur matter, and the seeking and finding of drugs proceeds apace. Plants and herbs,

instead of being turned into medicine by the crude method of eating them indiscriminately, and then being guided by the symptoms and experience of the survivors, begin to be tried with malice aforethought as remedies for a particular disease.

The properties of an herb or root which suggested its use in some particular disease were often of the quaintest and most extraordinary character. Liverwort and hepatica have each a leaf rudely resembling the outline of the liver; therefore they ought to be of value in jaundice and biliousness, and for centuries they enjoyed high reputation as remedies in diseases of the liver.

Seeds, berries, or leaves which happened to be either star-shaped, cross-shaped, or in the magic trefoil form, acquired all the occult powers which the symbolism of the day associated with the star, the cross, and the shamrock. Clover tea as a cure for cancer, for instance, owes its reputation solely to this symbolic association.

Plants or roots with red juice were supposed to be good blood medicines; those from which yellow decoctions could be made had a corresponding power over the bile or the urine. Substances that were black, or would make a black decoction, were of extraordinary power in desperate diseases and serious maladies, both bodily and mental, which were believed to be due to possession by evil spirits. Even as late as Sir Walter Raleigh's day, during a serious illness, a black cock was split and applied warm and bleeding to the soles of his feet. The necromantic powers of a black cat and the deadly certainty of action by black pills, no matter

what they are made of, are household words. Only three years ago, within twenty miles of New York City, a case was reported to me by a cousin of the patient, in which the still warm and bleeding skin of a freshly killed black cat was applied as a remedy for "shingles."

Herbs, flowers, seeds, or roots were valued according to the place where they grew, the time of year at which they blossomed, the stage of the moon in which they were gathered, whether they were cut with a silver or an iron knife, and a thousand and one extraordinary connections were invented and believed in between remedies and the diseases which they could control. Plants that grew, for instance, around the tomb of a saint, would heal everything they touched, and even raise the dead; while those that sprouted in the rank grass at the foot of the gallows tree were correspondingly deadly and poisonous. We laugh at such things now; but most of us would go a mile out of our way on a dark night sooner than pass by a graveyard or a place where a man had been hanged.

One remedy of wondrous potency in mediæval medicine, the famous mandrake, or *mandragora*, owed its reputation solely to the fact that, its root being forked and its juice blood-red, it was supposed to resemble the human body and hence had marvelous powers over it.

The wildest stories were believed about it: that it actually shrieked or cried out when it was being dragged from the ground, and that any one hearing that cry would die within sixty days!

Hence mandrake-gatherers took with them a dog

which they tied to the plant, after very cautiously and gently loosening the earth about its root, and then retreated to a safe distance until his tuggings should have uprooted it. So the poor canine had to hear its death cries and bear the curse. They might have had the decency to use a cat, which would still have had eight lives left.

Iron, now regarded as a blood food, was originally introduced into medicine as a new magic metal peculiarly obnoxious to evil spirits, which idea still survives in the familiar potency of the horseshoe as a charm against witches and all sorts of ill-luck. Later, by an even more familiar process of savage logic, it was believed to impart to the body of the man who took it something of its own hardness and cutting keenness, just as the Indian ate the heart of the bear to give him courage. This impression was powerfully aided by its highly astringent, puckery taste. To this day, in England, they talk of a "steel" tonic and "steel" pills. This is not the only claim that iron has to be regarded as a tonic, but it was the original one.

In the same way, nitrate of silver, *lunar caustic*, came to be used as a remedy in insanity and nervous disturbances, because silver was the color of the moon, and the moon, the goddess Luna, as every schoolboy knows, is principally concerned in the production of "lunacy." When a man is crazy he is still "moon-struck," or "looney."

As Oliver Wendell Holmes records, in his early days nitrate of silver was a standard remedy for epilepsy, because this was originally believed to be caused by

the influence of the moon; and he himself had seen unfortunate epileptics so saturated with this drug that it had become deposited under their skins and blackened by the light as on a photographic plate, so that their complexions were turned a dull, slaty gray.

Gold was always a great favorite because, being the king of metals, it imparted some of its royal qualities to the body that absorbed it, and enabled it to resist the attack of disease as the noble metal itself resisted the bite of even the strongest acids. Upon this fond delusion of the popular mind was based the famous "Gold Cure" of only a decade or two ago.

From such a seething welter of ignorance and superstition, from such a witch's caldron of absurdities, have sprung the majority of our remedies in use to-day. This is chiefly due to the extraordinary and incredible ancientness of drugs. Opium, for instance, is older than bread; and iron was first used as a medicine, because it was *new* and hence hateful to the old gods, in the Bronze Age at the latest.

Is it any wonder that the struggle to rationalize medicine, to bring order out of chaos, has been so tremendous and that progress in the fight against superstition and error has been so discouragingly slow?

One of the greatest obstacles to progress, the gravest difficulty in sifting the helpful from the worthless, has been, and is yet, that, inasmuch as some eighty-five per cent of all illnesses get well of their own accord no matter what may be done or not done for them, *any drug which is used with sufficient constancy and indiscriminateness in any disease will score eighty-*

five per cent of cures, providing that it is not positively harmful.

Even to-day it is one of the hardest but most necessary things to get clearly in mind that the triumphs, the "cures," achieved by any new remedy must be "loaded," as the calculators say, with this six-to-one standing handicap in its favor. It must not only be shown that seventy-eight per cent or ninety per cent of the patients who took a drug or other remedy got well, but that more of them recovered than of those who did not take it.

This progress of therapeutic house cleaning, of "*Transvaluation of Values*," as Nietzsche called it, is precisely what the medical profession to-day is engaged in carrying out and applying to every drug upon its shelves and upon the pages of its pharmacopœia. It is a huge undertaking, but we are looking forward to a magnificent clearance of ancient rubbish before we are through with it.

Some drugs of real value will survive; but their numbers will be counted by tens instead of by thousands, as at present. In fact, next after the fight against disease, the biggest struggle that the coming doctor has on his hands is with drugs and the deadly grip which they have upon the confidence and the affection both of the profession and of the public.

Another of the gravest difficulties of the drug problem is that the oldest, most highly prized, and most universally used drugs are unfortunately the most dangerous and poisonous. The "simple, old-fashioned, household remedies" that we hear so much vaunted,

number among them the most dangerous drugs that we have. Laudanum or paregoric or some "Pain Killer" or "Soothing Sirup," or other form of opium, stands on every family medicine shelf, just as it did under the eaves of the bamboo hut of primitive man.

Alcohol in some form comes next, either as "Good Old Whiskey" or "pure, homemade wines" or cordials — many of them strong enough to blow your head off — or somebody's "Bitters" or "Tonic." *Take away opium and alcohol, and the backbone of the patent-medicine business would be broken inside of forty-eight hours,* because these are the only drugs known to science which will make any one, no matter what may be the matter with him, "feel better," for a little while, at least, after he takes them.

Why such dangerous drugs came into vogue at such an early period in the history of healing is not far to seek. Primitive man was not much addicted to minor ailments. Like animals in a state of nature, he could not afford to indulge in "functional" diseases, — like headache and hysteria and nervous dyspepsia and muscular rheumatism, — for he had to fight for his life every day, and sometimes two or three times a day; and if his head ached, or his arm or leg were stiff enough to handicap him more than ten per cent, he promptly fell by the wayside and was utilized for provender. Whenever he was sick, he was sick "for sure," as the vernacular has it; and he either died or got better with commendable promptness.

So that whenever either the Wise Woman or the Medicine Man was sent for, they usually found a pa-

tient who was either just about to die, or thought he was with some show of reason for his belief. It was no time for *placebos* or bread pills or gruels. Something had to be done or given which would produce an outward and visible sign of its inward and spiritual effects with neatness *and* dispatch. An emetic was a pretty good suit to lead from — you got visible returns at once; a cathartic, for equally obvious reasons, an excellent right bower; while opium was not merely trumps, but the ace of the same in almost every possible hand that might have been dealt to you.

Was the patient shrieking and writhing in the agonies of cholera, or a crushed chest, a single dose of the great Pain King would reduce him to a merciful, and by contrast, blissful state of unconsciousness within twenty minutes. Was he raving wildly in the delirium of fever or the delusions of insanity, opium would reduce his frantic outcries to mere drowsy mutterings. Was he gasping for breath in the agonies of acute pleurisy, opium again would make his breathing like that of a tired child. Was cholera pouring the fluids of his very life-blood out of his body at such a furious rate that he was literally shriveling like a sucked orange, opium would throw a temporary dam across the flood and give the panic-stricken forces of the body a moment's chance to rally in its defense.

Is it any wonder that opium, alcohol, hasheesh, coca, or some other narcotic, came to be regarded as not merely a sheet-anchor in disease, but as a staple necessity of existence — even, by a grotesque twist of popular logic, as a food? Not a nation can be found, not

a tribe anywhere upon the surface of the globe, that does not possess the knowledge of one or more narcotics, and habitually uses one or another of them not merely as a medicine, but as a beverage, a luxury, or a substitute for food. It is as easy to see how this extraordinary confidence in narcotics grew up and became so universal in the race as it is now to recognize how utterly illusory and delusive it was and yet is.

Gradually, as doctors and patients both became more intelligent, it dawned upon them that drugs and potions were not indispensable to recovery, that fevers ran a fairly definite course and stopped of their own accord, that the majority of diseases tended toward ultimate recovery. Less and less violent methods of treatment were adopted, vomitings and purgings and bleedings became less universal, and the habit grew up of depending more upon diet, bathing, and rest, putting patients to bed and using drugs simply to keep them comfortable and assist the body in its fight.

Finally, and it seems incredible that it was only about sixty years ago, we reached the point where we dared to let a few moderate cases of typhoid fever or pneumonia or rheumatism run their own course to see just what Nature would do, interfering only in emergencies, or in case of serious danger.

Results followed which are well under way to revolutionize the practice of medicine. First, the discovery that the healthy human organism possessed inherent powers of defense against disease, and that many of what we put down as symptoms of disease and even as parts of the disease process, such as fever, pain, vomit-

ing, diarrhœa, shivering fits and some forms of convulsions, are parts of Nature's effort to get rid of the poison. Our proper function is to intelligently assist Nature in her efforts, instead of thwarting her at every turn and suppressing every symptom as quickly as we can find a drug club to beat it down with. We now coöperate with Nature in disease, as in health, and check her only when she seems to have become panic-stricken and going to dangerous extremes. Just when to help and when to hinder, and how to help without doing harm — these are the problems that call for brains in a doctor.

The old, blind, implicit confidence in drugs is gone, the naïve belief that if we could only find and give the one right remedy it would "do the rest," like some magic button when pressed.

In its place is a wholesome, searching skepticism which demands proof, tests rigidly, rejects mercilessly. Scores of hoary old humbugs have already shriveled in its white light. As our modern physician-philosopher Osler phrases it: "He is the best doctor who knows the worthlessness of most drugs."

All the hundreds of old standbys of our books on *materia medica*, the dozens of ancient inhabitants of our medicine chests, the scores of new cure-alls of the advertising pages and the prospectuses, are being rigorously tested upon animals to find out their real and precise value and what it depends upon. Nothing is left to hearsay, or imagination, or expectation.

The result already is a demand for the cutting down of the drug lists taught in our schools from four or five

hundred to fifty or less, while Osler goes so far as to speak of "the six or seven *real* drugs!"

Even this small group of "*real*" remedies is looked upon merely as a group of tools, whose results will depend chiefly upon the skill with which they are handled. Moreover, as edge-tools, which will cut both ways and do harm as well as good.

No drug — save quinine, mercury, and No. 606 *in special cases — will cure a disease: only rest, food, sunshine, and fresh air can work that miracle.*

All that medicine can do is to call a halt and give Nature time to rally her forces. As well use bugles in place of bayonets as drugs in place of food or fresh air.

Meanwhile we are coming to use the remedies which survive from the past, and the new weapons put in our hands by modern science, in a new and often radically different manner.

Whole groups and classes of drugs are falling into disuse and new ones coming into play. Emetics, for instance, are being replaced by the stomach tube; cathartics by dieting and intestinal antiseptics; while tonics are falling gradually into disrepute because we have not the least idea what we mean by the term or how they produce their alleged effects save by their bitter taste or their influence upon the imagination of the patient. The only real tonics are cold air and exercise followed by food. As the great Boerhaave long ago declared, the best way to get benefit from the bitter-wood tree (*quassia*) is to climb up it, or chop it down.

On the other hand, since the priceless discovery that so many of our diseases are due to the pernicious activ-

ity of bacteria, or germs, a brand-new class of remedies has grown up — the antiseptics or germ-killers, both external and internal. Antiseptics will one day do as wondrous service for medicine as they have already for surgery; but at present their utility is sadly limited by the fact that, the human body being simply a colony of animal germs, they are almost as deadly to our own cells as to the invading bacteria.

We have a few already which kill the germs without injuring the body, such as quinine in malaria and mercury and "606" in syphilis, and the laboratories are working night and day to add to the number.

Poisons are being invented, and even specially created by modern synthetic chemical methods, to kill each particular germ or organism.

Some idea of what may one day be hoped for may be glimpsed in the late announcement of Ehrlich that he had built up a new arsenic compound, with a seven-syllabled name, the already famous "606" or *Salvarsan*, which would clear the blood of the *spirocheta* of syphilis in forty-eight hours, a feat which mercury takes from three to nine months to accomplish. The tests made of it so far support this claim in a remarkable manner, but, of course, thousands more must be made before we can accept his claims and assign the new remedy its final place.

But our most valuable and hopeful modern "charms" against disease are leaves plucked from Nature's own book.

Like the early Quakers, we are turning to the "light within" and utilizing our own internal, homemade remedies.

When a fever "runs its course" and we begin to recover, we do so by virtue of certain antidote substances or *antitoxins* formed in our blood, which neutralize the poisons or destroy the bodies of the invading germs.

These antidotes are usually present in small amounts in all healthy blood; indeed, a sound, vigorous body is a most inhospitable and unwholesome place for strange germs to wander into. This is why not more than one in five of us who are exposed to an infectious disease ever catch it.

The entrance of the disease germs starts the body cells to pouring out more of these antibodies, as surely as the intrusion of a strange cat into a garret sets all the resident felines to bristling and spitting, and almost as mechanically as the bark of a pine tree pours out protective gum when bruised.

If the body cells can "do it first" and hurry enough troops to the front, then the invaders are overwhelmed by the antibodies and either killed and eaten on the spot, Fiji-Island fashion, or handcuffed and thrown into jail, or simply deprived of their weapons and set at liberty under bonds to keep the peace. This may sound like romancing, but it is merely a figurative transcript of what literally happens, the "hostiles" in the first case being eaten by the leucocytes, or white blood cells; in the second engulfed and imprisoned alive in their bodies, or in masses of body cells poured out to bury them — and from either of these prisons they may later escape and produce a relapse; while in the third the poisons or *toxins* of the germs are merely

"antidoted" by the antibodies and the germs themselves remain in or wander harmlessly through the body.

The problem is how to get hold of the natural antibodies or antitoxins in sufficient amounts to use them in curing or preventing disease in others.

As they remain for years in the blood of their "manufacturers," protecting them against a second attack of the disease, often even for life, giving them the original "immunity bath," now so popular with other and larger corporate bodies — it was first attempted to secure them from the blood of convalescents.

This was found impracticable because the blood was never rich enough in these bodies to give the small amounts available any power over disease germs when diffused all through the blood of another patient, although they might check their growth undiluted in a test tube.

Indeed, after some diseases there was almost no free antitoxin in the blood, the cells seeming to have only learned the knack of producing it as it was needed. In fact, immunity, like wisdom and other fruits of experience, can seldom be passed on to others.

Our only resource was our friends, the animals; and by selecting a species which had a fair degree of resisting power to begin with, injecting a moderate dose of the bacilli in question, then as soon as it had recovered a larger one and so on, we succeeded in getting the blood so loaded with antitoxin that even doses which could be safely injected with a hypodermic syringe would contain enough to stop the progress of the germs.

This process carried out upon the horse gave us our first and greatest triumph in antitoxin medication, the diphtheria antitoxin, whose marvelous victories are already a household word.

It is only a question of time when we shall possess like cures for many other diseases. But the difficulties in the way are grave, and will take time and many laborious and expensive researches to overcome.

In some diseases, like typhoid and tuberculosis, the antitoxin is only produced, as described, in very small amounts at a time, so that we cannot collect enough of it even from the blood of animals after successive inoculations. In others, like pneumonia, apparently only just enough to check the disease is made and no surplus whatever left, so that the patient is just as liable as before to have a fresh attack; in some cases even more so.

An even more hopeless and curious condition is found in tuberculosis, where the bacilli, to a considerable degree, like the black-and-white furry infester of our henroosts, do not discharge their poisons unless attacked and partially broken down by the body cells, so that to inject larger amounts of an antibody or antitoxin may mean the liberation of larger and more dangerous amounts of the germ poisons.

In other diseases, the crux of the problem is that we have no known animal which will "take" the infection and hence form antidotes against it.

This halted and puzzled us for years in smallpox, in syphilis, in cerebrospinal meningitis or "spotted fever," and in infantile paralysis.

Finally, it occurred to investigators that man's nearest of blood kin, the monkeys and apes, might prove susceptible to his peculiar diseases. When the expense of securing and difficulties in keeping and handling had been overcome, within two years we had by this means discovered the germs of syphilis and probably smallpox, an antitoxin for "spotted fever," and the foundations for a weapon against infantile paralysis.

These last two achievements fall to the credit of American science through the enterprise and industry of the Rockefeller Institute and its brilliant head, Professor Simon Flexner.

The death rate in spotted fever has always been high, nearly three fourths of those attacked dying, and half the survivors being left blind, deaf, or paralyzed for life. No remedy had the slightest effect.

The Flexner antitoxin, or serum, has now been tested upon some thirteen hundred cases, scattered all over the world, and *over three fourths* of those treated have recovered, thus almost trebling the former rate!

Infantile paralysis, whose wide distribution all over the country is now exciting so much uneasiness, as it kills nearly a tenth of those attacked and leaves two thirds of the remainder more or less crippled, is still a puzzle. But its solution is practically in sight, for while the researchers at the Rockefeller Institute have not yet succeeded in identifying the germ, they have been able to transmit the disease to monkeys and to pass it through a series of these, thus rendering the production of an antitoxin probably only a question of time.

There is also another way in which germs and their products have been harnessed in our service, for the cure and prevention of disease. On a sort of reversed "hair-of-the-dog-that-bit-you" principle, small doses of an infection, which in large ones might kill you, will save your life. The process might be described as "curing in advance."

Very small doses of virulent germs, or larger doses of the germs weakened by heating, or exposure to light, or growth under unfavorable conditions, are injected. These set up a sort of imitation attack of the disease, and produce such large amounts of antitoxin in the body as to protect it against a full-strength infection.

This protection may last for years, or even for life, and is the well-known vaccination, longest practiced and best known against smallpox. The disease *vaccinia*, which produces the familiar vaccine virus, is smallpox which has passed through a long series of cows and possibly through a series of horses before that, though this is not certain. It has become so much milder as to be free from danger to life, but gives as complete protection as a full attack of virulent smallpox, only not for so long a time, from five to fifteen years instead of for life.

For many years vaccine virus was our only vaccine, but now we have a dozen or more of positive value and as many more claimants for the honor.

The best and most widely used so far is that against typhoid fever. This consists of an injection of dead typhoid bacilli and their toxins, killed by heat. It produces a slight attack of headache, feverishness, and

discomfort, lasting three or four days, which forms enough antitoxin to give a marked though not complete immunity against the disease for from three to six months. On account of the shortness and incompleteness of the immunity, it has been chiefly applied so far to soldiers entering upon a campaign in the tropics, or others who expect to be markedly exposed to infection for the following few months. Its results have been very encouraging. In large bodies of troops inoculated, less than one fourth as many contracted typhoid as in unprotected regiments camping and campaigning with them; and of those who contracted the disease, scarcely a third as many died, making the net death rate more than ten times as great in the unprotected men. Now by a succession of inoculations at intervals of several weeks the period of protection has been lengthened to two years and possibly, after four inoculations, for life.

The method was devised by Sir Almroth Wright, then Chief Pathologist in the Medical Department of the British army, and first extensively used upon the troops in the Boer War. It has been steadily worked at ever since, and of late largely used on our American troops in the Philippines and on the Mexican border with encouraging results. By other methods of modifying the cultures injected, the "imitation attack" has been made milder and the period of protection longer, reaching a year or more, so that it is now being advised for general use and also for curative purposes in an attack of typhoid by hastening the "piling up" of the antitoxin in the blood.

We have also vaccines which give excellent results

in a certain percentage of cases of boils and other so-called *pus infections;* and even "common colds," which are almost always infections, are often effectually treated and cut short by injecting into the blood killed cultures of the germs found in the nasal or throat discharges of the sufferer.

Thus our line of defense against those numerous diseases which are due to the attack of germs from without has been greatly strengthened by the new discoveries, but how as to our foes within, the disturbances due to changes and upsettings of balance in our own body chemistry? We are making advances here also, not as marked or as striking yet, but of almost limitless promise for the future.

In our search through the body for antibodies and antitoxins, we discovered that our blood and all our vital fluids were full not merely of liquid food and waste substances, but of natural tonics and sedatives, of stimulants and restorers of the body balance generally. In fact, we are walking pharmacies as well as machines and thought factories.

These original "blood medicines" are the so-called internal secretions, or *enzymes* (ferments). To put it very briefly, each one of the great solid or glandular organs of the body — the liver, kidney, pancreas, thyroid, thymus, suprarenal, et cetera — pours into or takes out of the blood one or more of these ferments, which are absolutely necessary to the health of the body. If any of these *enzymes* is deficient in amount, or poured out in excess, disease results.

When we have got their precise relations to each

other and to the bodily health more thoroughly worked out, it is not improbable that we shall gain as great a mastery over internal diseases as we now have over external ones, by finding out which *enzyme* or ferment is deficient and then supplying it from the corresponding gland of some healthy animal.

For instance, it is already known that diabetes is largely due to the failure of an *enzyme* produced by the pancreas, the great digestive gland of the upper bowels; that a peculiar form of dwarf idiocy known as *cretinism*, and *myxedema* also, are due to deficient secretion of the thyroid gland, which lies just on either side of our "Adam's apple" and when swollen produces goiter; that *arteriosclerosis*, the decay of the muscular coat of the walls of the blood vessels, which plays such an important part in heart disease and kidney disease, as well as in premature old age, is closely connected with the secretion of the suprarenal gland, lying just above the kidney.

It is not improbable that the failure of some glandular *enzyme* is the underlying basis of that terrible rebellion of the cells, cancer. In fact, internal medicine has as many triumphs in sight as surgery has already achieved. Already by the administration of the extract of the thyroid gland of the sheep we can turn a semi-idiotic dwarf of thirty years into a fairly intelligent, well-behaved, self-supporting human being of about two thirds normal stature and powers, a comfort and a help to his family instead of a burden and an affliction.

An extract of the suprarenal gland of the sheep is one

of our most useful remedies in certain diseases of the heart, blood vessels, and kidneys, and the list of these "natural drugs" is growing swiftly, nearly a dozen "glandular extracts" being in common use.

Ovarian extract, for instance, is widely depended upon for the relief of disturbances of this function.

Further and still more curious, we have found that the different organs of the body send a variety of "messenger-boy" substances through the blood, known as *hormones*, to stir up the activities of other coöperating glands or organs. For instance, the mouth sends *hormones*, picked up from the food, through the blood to the stomach to warn it what sort of gastric juices to secrete, and the stomach sends other messengers on a similar errand to the pancreas and bowels.

The muscle cells all over the body when their blood supply becomes impure, send a *hormone* (carbon dioxid) to the medulla, at the base of the brain, to make the lungs breathe deeper and the heart beat faster.

Some of these "messengers" have been identified and extracted so that we can now use them to stimulate the activities of certain glands and organs at will.

It looks as if the medicine chest of the future would be largely stocked with antiseptics, antitoxins, glandular extracts, and *hormones*, or "messenger" substances.

The most rigorous testing and scrutiny are being applied to all new remedies with which both manufacturing chemists and laboratory workers are supplying us, many of them of great interest and value. Two special councils or bodies of experts, for instance, are

appointed by the great national medical associations of both England and America, to whom are submitted all new drugs, preparations, glandular extracts, antitoxins, et cetera. These they submit, first, to most rigorous chemical analysis; second, to actual tests upon animals; and third, if they survive both these, to intelligent and cautious administration in the hands of selected physicians.

Full reports are then published in the columns of the medical journals of the associations; and while there is nothing obligatory about their findings, the practical result is that a rapidly increasing number of intelligent physicians and of the more progressive hospitals absolutely refuse even to try any remedy until it has passed the tests of these examining bodies and proved itself to be of real merit and free from danger. What is even more practical in its effect, the leading journals on both sides of the Atlantic refuse to accept, or publish, the advertisements of new remedies which have not passed these tests.

Of course it goes without saying that the heaviest artillery of our future warfare against disease will be directed toward its prevention rather than its cure. The best and only radical cure of disease consists in preventing its spread and wiping out the conditions which alone render its existence possible — poor food, dirty water, bad drainage, dark and ill-ventilated houses, overwork, under-pay. More and more of our energy and brain power will be devoted to the cheerful, positive task of keeping our bodies so strong and wholesome and vigorous that they can defy disease, instead

of the negative and melancholy one of patching them up after they are sick.

But as long as accidents can happen, disease will occur; and there is little merit and but cold comfort in lecturing a drowning man upon the folly of having stepped upon a rotten plank or waded beyond his depth. We must throw him a rope of some sort, with a noose on the end of it, and try to get it over his head even at the risk of half strangling him.

Drugs are playing a rapidly diminishing part in our war upon disease, but they will long be necessary for such emergency, life-preserver uses, and in skilled hands will be of priceless value and save many a life.

The battle for health is set upon a titanic scale, a veritable Armageddon. The huge and incalculable interests at stake, the enormous labor, the tireless research, the vast expense, the endless repetition of test after test, put it beyond individual powers and resources.

It is not complimentary to the intelligence of our statesmen, to the good sense of our people, to see our great national and state governments stand idly by and allow nine tenths of the burden of the vast warfare for the public weal to be borne by individual workers or by private munificence. We urgently need a great National Board or Department of Health, such as all other nations in the van of civilization already have, to search out the causes of disease and the means for their removal, to prevent the spread of disease, to protect the purity of our interstate streams and water supplies, to bar out epidemics from abroad, and to

curb the greed that produces unsanitary conditions at home.

The relief of disease is no longer a matter of providing a few magic powders or soothing potions. We have got past that.

We no longer believe that any drug, of itself alone, will cure any disease. It must, like Turner's colors, be "mixed with brains"; and those same brains, applied to a search for and removal of the cause, will cure far more diseases without any drug at all. Food, rest, sunshine, exercise, bathing, massage — these are the sheet-anchors of our new *materia medica*.

No longer is the doctor inseparably associated with the druggist and the undertaker.

Soon he will prove that the only necessary connection between doctors and drugs is that both begin with the same letter.

CHAPTER II

HOME DOCTORING

NOT all our memories of the past are rosy. Lovingly as our thoughts may linger around the old swimmin'-hole, the little trundle-bed, the moss-covered bucket, "the little window where the sun came peeping in at morn," there is one rather vivid chapter of our childish recollections which they distinctly prefer to skip. A golden mist still hovers about the memories of baking-day, but an exhalation of totally different color — and aroma — surrounds our recollections of spring medicines, boneset tea, castor oil, and Gregory's powder. Have we ever tasted anything quite so nasty since?

And the bitterer they were the better, the more confidence was felt in them. One of Frank Stockton's delightful mothers in Israel had such a remedy, which had never failed her. It always cured Jabez, no matter what ailed him. "Makes no difference how bad he is, within twenty minutes of the time he's tuck it, he's well; would n't know anythin' wuz the matter of him 'ceptin' a bitter taste in his mouth."

Nor was this bitterness a mere accident. On the contrary, it throws an interesting light upon the origin not merely of household remedies but of medicines in general.

The earliest conception of disease of which our savage ancestors were capable was unquestionably the old, familiar one of demoniac possession. Even to this day the language of the sick-room is full of traces of it. The patient is "attacked" by pneumonia, is "seized" with a chill, "throws off" a cold or "is thrown into" a convulsion, should "feed" a fever and "starve" a cold, is "threatened" with typhoid. Disease is a personality, to be avoided, fought, conquered, frightened into leaving.

To drive out this demon are naturally and logically employed the horrid noises and incantations, the beatings and poundings, not only of tom-toms, but of the luckless patient himself, of savage medicine, the horrible smokes and vapors, the nauseous messes and bitter drafts, the violent extremes of the steam-hut and the ice-plunge, the drastic emetics and purges — anything to make the place too hot for the bad spirit.

Of the tom-toms nothing remains save an occasional sentimental vaporing about the cure of mental diseases by sweet music, of the poundings and punchings only the "bone-setters" and the rougher parts of osteopathy, of the smokes and vapors only incense and assafœtida, the classic burnt-feathers and smelling-salts; but of the nauseous messes, bitters, and purges a whole brood of every-day remedies, ranging from boneset to the bitters of our pharmacopœia, and from "seeny" tea to calomel.

Domestic medicine, being an echo of the regular medicine of a century or two ago, naturally retains more of these bitter and nauseous survivals. No need

of proof, to any one who remembers his own experiences, that household remedies are of demonic origin in more senses than one. Their taste proves their pedigree. Among the ignorant, whether in the slums of our large cities or in remote rural districts, no medicine inspires much confidence unless it be either bitter or nauseous.

In my student days in a London hospital we had in the pharmacy a large demijohn of a mixture known as "The Dead-Shot." It was compounded as follows: Into it were thrown all the odds and ends of drugs left over from making up other formulas, then a handful each of aloes, cinchona bark (crude quinine) and assafœtida and a pint of tincture of capsicum were added, and the carboy filled up with water.

This made a tonic of gorgeous potency, smelling to high heaven, which would pucker your mouth clear down to the diaphragm and make your eyes water for twenty minutes after taking — but had absolutely no special therapeutic effect and was perfectly harmless.

Whenever one of the old chronic medicine-takers, the sort who enjoyed ill-health and came to the dispensary chiefly for the pleasure of talking over their symptoms, — and there are scores of such among the poorest as well as among the rich, — began to get troublesome and complain that his medicine was n't doing him any good, "did n't seem to have no stren'th to it," the "Dead-Shot" was prescribed.

Its effects were always good. Either it drove the malingerers away entirely or they would come back delighted to brag of its effects: "That's somethin' *like* a

med'cin'. I could just *feel* it take hold!" "Why did n't you gimme that before, Doctor?"

But is this the only value possessed by bitters of all sorts? By no means. Used indiscriminately at first, just because they *were* bitter, certain of them gradually were found to have positive curative properties, in certain conditions: such as quinine in ague, aloes in constipation, strychnine and caffeine in depression, opium for the relief of pain, gentian in loss of appetite. The fittest and most useful survived and were gradually assigned to their proper places in the treatment of disease. Others were found so poisonous or so irritating that they were given up entirely, though I have several times heard an infusion of peach leaves, containing a dangerous amount of prussic acid, warmly recommended as a sovereign home remedy for ague.

You will remember there was a virtue in quantity. The more you could drink the more good it would do you. Trifling rewards were offered for cups above so many, or a generous rivalry in bibulousness between Sister Sue and yourself was encouraged. You drank till you felt like bursting, then you were put to bed in hot blankets and, oh, how you did sw — pardon me — perspire! When you woke next morning your cold was gone, or at least "real loose."

The hot water and the warm blankets did the work, the "yarb" got the credit — just like scores of other medicines, not all of them domestic, by any means. Any remedy, or procedure, that involves hot drinks or baths, sweats, and rest in bed is safe to score a high percentage of cures.

Then there were the spring medicines of happier memory, the cheerful pink color and spicy taste of sassafras, of sarsaparilla, of cherry-bark, of slippery-elm, the heavy, gritty sweetness of sulphur and m'lasses (*Anglice*, brimstone and treacle), and the wild spring greens and dandelion, hops, pokeweed, which were "so good for the liver."

It is a little difficult to assign any definite origin for this curious group, or to give any rhyme or reason why "in the spring the young man's fancy" *should* "lightly turn to thoughts of" — sarsaparilla. Most of them are as absolutely inert as rose-water, and can at best be described as simply harmless and comforting. How the impression ever arose that they or any other kind of medicine were habitually required at this time of year seems hard to conjecture.

A vague popular feeling appears to have been in the air in all ages that a fast, a spare diet, and vegetable infusions in the place of strong liquors, are desirable at this time of the year. An explanation quite commonly given by those who use them is that they "thin the blood."

No one who has not experienced it can conceive of the tremendous and ravenous hunger for green stuff, fresh fruit, or anything approaching them, which comes on in the late winter and early spring months on farm diet. There have been no vegetables except potatoes, and perhaps sauerkraut, for months. The apples have given out soon after New Year's, and, until the fashion of canning fruits came in, there was little or nothing to take their place. This was also the time of

the keenest pinch of hunger for primitive man, when game was scarcest and his little hoard of nuts and berries most likely to be exhausted. No doubt in the spring he was habitually driven to eat bark, roots, leaves, anything that he could get; and it is barely possible that in these fragrant teas made from the spiciest and least bitter of the barks and roots we may have a sort of memorial service over the remains of the savage primeval spring bark-and-root hunger.

Certainly, with the spread of the methods of canning fruits and vegetables, and particularly since the introduction of that priceless vegetable-fruit which keeps tart and fresh, even though canned, the whole year round, the tomato, and the use of the hotbed, or even the importation of Southern-grown lettuce and radishes, the spring-medicine habit has rapidly waned. As a shrewd old farmer's wife remarked to me twenty years ago, "*I* find pie-plant 's the best spring medicine for my folks."

In other communities the spring-medicine idea seems to have taken a form based on the belief that there have accumulated in the body during the winter a mass of waste materials popularly known as bile, spleen, "janders," and that something is necessary to get this out of the system, said something usually being in the form of a more or less drastic purgative. But the necessity for this, if it ever existed, has, of course, also entirely disappeared with the vast improvement in modern diet.

This, however, brings us naturally to the sheet-anchor of the home physician — laxatives. These

again have a very interesting history, the same mingling of an utterly irrational origin with a gradually restricted rational use. Primarily there is no question but that they were all of one piece with the tom-tom and the bitter draft, namely, for the purpose of making an evil spirit so uncomfortable that he would leave the patient, or, by a crude literalization of metaphor, to actually sweep him out of the body.

Even to this day this is the attitude toward them of a considerable element of the more ignorant classes of our community. Their first instinct, when they feel themselves out of sorts in any way, is to take something that will "get it out of their systems."

I have often heard my colleagues in Scandinavian communities of the Middle West say that, if you did n't give a Norwegian farmer a powerful laxative as your first dose, he did n't think you were any doctor at all. I have come across this feeling hundreds of times in the country districts, both East and West. In fact, it is always advisable, before prescribing a laxative, to inquire whether the patient has not already taken one, no matter what the disease may be. I can well remember hearing a colleague most bitterly criticized by the friends and relatives of a Welsh miner, who succumbed to his injuries two or three days after being frightfully burned in a mine explosion, because he had not given the victim any purgative to "take the fire out of his system." If he had done so the patient would certainly have recovered, in their opinion.

There is nothing in all her household medicine chest upon which the Wise Woman of the neighborhood will

dwell more lovingly than the virtues and the conquests of her favorite laxative, whatever it may be. The feeling is the same in Occident or Orient, and has never been more delightfully phrased than by the shrewd old Hindu grandmother in Kipling's "Kim," who speaks in terms of wonder and admiration of an astonishing pill given to her by Hurree Chunder Sen, which was "of the tiniest, oh, scarce a millet-seed, so small one could hardly see it; yet once swallowed it wrought like a devil unchained!"

Primarily, speed and vigor of action being the chief desiderata, the most drastic and even dangerous remedies were not merely used, but actually preferred: croton oil, gamboge, elaterium, dram doses of calomel, and half-pound doses of salts. These, of course, did the maximum of harm with the minimum of good in both lay and professional hands, and were gradually either completely discarded or enormously reduced in dosage. Great as has been the improvement, by the introduction of milder remedies and the use of comparatively insignificant doses, laxatives still play far too large a part in medicine, both household and professional. They have a field of usefulness which is both wide and important, but the blind belief in their value as a preliminary measure under all sorts of conditions is rapidly dying out. How widespread this confidence in them was at one time is amusingly illustrated to this day in the experience which has been had scores of times by every practicing physician as to the effect of pills.

Pills were originally invented for the administration

of laxatives only, covering up their bitter taste. This, of course, could not be done with the pure bitters or bitter tonics, as an important part of their virtue was believed to reside in the taste. Hence, bitters and laxatives being far the most common medicines, anything which was in pill form was supposed to be purgative.

To this day if you give the average patient a pill, especially if it be black, and to be taken at bedtime, he is almost certain to think that he is taking a laxative. Indeed, I have heard colleagues assert that all that was necessary was to administer one or two black pills at bedtime, regardless of what they might contain, to get such an effect.

Peace to the memory of the old home laxatives! They had their uses, and still have, within proper limitations, and out of the ruck of them have emerged many valuable and fashionable modern remedies, like cascara, podophyllin, euonymin, and aloin.

Next in the affections of the house-mother after her bitters and her laxatives came her oils and liniments. They were a rich and unctuous group, and their perfumes were hardly those of sachet powder: Goose grease with an onion boiled in it, or, better still, fried and dropped in hot chicken fat; bear's grease; rarer and more wondrously effective, skunk oil, secured at Heaven knows what risk to clothing and noses; and crown jewel of the cabinet, rattlesnake oil. Nor were their virtues restricted to the comparatively narrow field of the modern liniment: sprains, bruises, or swollen joints. Rubbed on the chest, they were a sover-

eign remedy for croup or bronchitis, rubbed on the back they would cure the whooping-cough, put on the soles of a child's feet they would prevent night-sweats. As for rheumatism or bruises, just show me the case that they would not cure within five applications!

Now, there is no question that they can point to thousands of cures to their credit, but widely remote as may be their origins and extraordinary their character, they had one thing in common, they all had to be "rubbed in thoroughly," and the more thorough and tireless the rubbing, the more completely the oil was made to "disappear," the better would be the results. In fact, their virtues were solely due to the vigorous massage which accompanied their use. It was believed at one time that this industrious "rubbing in" caused them to be absorbed, and of course, in the crude logic of the peasant, oil rubbed into a stiff joint might naturally be expected to lubricate it somewhat. This is now known to be a delusion, as practically nothing can be absorbed through the human skin. All remedies which are administered by "rubbing in" are now known to be volatilized by the heat of the body and their vapor inhaled through the nose and mouth. An interesting illustration of this is given in the use of the oils already alluded to, namely, either those which had a strong aromatic odor of their own, or were impregnated by means of onions, turpentine, "camfire," and ammonia. Such benefit as they might give when rubbed on the chest or back of the patient suffering from lung trouble was due to their aromatic element being volatilized and inhaled into the lungs of the patient.

We must not forget the poultices, warm, soft, clinging; what relief they did give to the aching muscle or the throbbing joint! Their name also was legion. Linseed, bran, slippery-elm, hops, potato, bread-and-milk — anything that could be made into a pulp so as to retain moisture and heat.

The poultice-makers had their flights of the imagination as well as the poets. A very common dressing in the country districts for either a fresh wound or abscess is a large quid of fine-cut tobacco, affectionately chewed and bound upon the part. If it happened to be an unbroken abscess, boil, or swelling, no particular harm was done, but if it were an open wound, absorption of the tobacco might take place in alarming amounts; and serious symptoms of nicotine poisoning have been reported from all over the country from this cause, and even one or two deaths.

Occasionally a little bit of the old, demoniac tendency to use the *outré* or the disgusting crops out, as in the case of the familiar poultice of barnyard manure, which almost every one has heard suggested, and the firm belief in very remote regions that a black chicken or cat, killed, and split open while still warm, makes a splendid application to a rheumatic joint.

I remember in the early days of my practice a small boy who was brought into my office by his mother, to have an abscess on his finger looked at. I attempted to remove the home-dressing which he was wearing, and, after getting off the outside layer, found myself confronted by a brown, sticky, slippery mass in which the thumb was completely imbedded. It had a curiously

fruity smell which seemed familiar, and, on turning to the mother, I found that one of her neighbors had advised her to thrust the affected thumb into the centre of a rotten apple and then bind that on, which she had religiously done. As a poultice it was a great success, for I do not think I ever saw so large a felon on so small a thumb.

But alas! the poultice must go the way of the fairies. Soothing and comforting as they were before the days of antiseptics, modern science will have none of them. While they relieve pain, they encourage the growth of the micro-organisms which produce inflammation, and their effect is usually to either turn a simple inflammatory swelling into an abscess, or to make a small abscess develop into a larger one. Not only that, but they soften the surrounding surface, and furnish a splendid hotbed for the streptococcus to both grow in and travel under to other portions of the skin.

Many and many a time do we see a single boil, for instance, which has been poulticed, followed by a crop of secondary boils, which have sprung up all around the first one, like a "fairy-ring" in the grass, under the sheltering cover of the poultice. The modern antiseptic dressing, with an evaporating lotion, not only puts a stop to all this, but gives even greater comfort and quicker relief.

No doubt the mere mention of these remedies has stirred up in your memory the recollection of scores of others, some of them, perhaps, explicable upon some curious ancestral or directly utilitarian ground, others of them the purest of freaks, with no apparent relation

to anything else in the heavens above or in the earth beneath. Some seem to depend for their virtue upon being *outré* and extraordinary as possible, such as the drinking of warm blood as a cure for consumption, the eating of a roasted mouse as a cure for rickets, the swallowing of a little pellet of cobwebs to stop the spitting of blood, the free application, internally or externally, of garlic, onions, assafœtida or ammonia for all sorts of disorders.

Some of these have very curious and interesting histories into which space forbids us to enter. One, however, has such a singular connection that I cannot forbear to mention it, and that is, the great universal "blood purifier," clover tea. This has received a fresh notoriety of late years by being brought forward as a remedy for no less terrible a scourge than cancer. As usually made, it is as absolutely inert as an infusion of hay or corn husks, and can be drunk by the quart or the gallon without any danger whatever save that of drowning. Its sole standing as a remedy is a ritual, not to say ecclesiastic, one, due to the fact that the leaf of clover, containing three leaflets or "foils," like the shamrock of St. Patrick, has been taken for centuries as a representation of the Trinity, and hence endowed with healing virtues. It has an even older cryptic history than this, but that is too long a story.

Take them altogether, they are a cheerful, comforting, comparatively harmless crew. Some of them are sufficiently poisonous to be a source of danger, but these are being gradually weeded out. Others have been and are yet used too indiscriminately and too

blindly. But the fittest only are surviving even among them. The oils were only dangerous if they were rubbed in too hard; the poultices were the only group which, perhaps, on the whole, did more harm than good. In fact, the chief danger of household medication is to be found in another direction, and that is the extent to which it may postpone the recognition and proper treatment of serious disease.

But here, of course, the average man is in a quandary. There can be no question that fully one-half of all the disagreeable sensations of impending cold or iliness which one experiences will pass away completely under the influence of a hot drink and a good night's rest. Two thirds even of all distinct diseases which do not thus disappear will ultimately get well if nothing is done for them, though, of course, often at the cost of great increase of pain, danger and slowness of cure. Hence the basis for the confidence felt in home remedies — which equally underlies professional ones.

Naturally, under our existing relations between physician and patient, any one hesitates to go to the expense of consulting a physician unless he is reasonably sure that it is really necessary. An immense amount of valuable time is often lost in this hesitation.

A great help toward the solution of the difficulty would be the recasting of our system of medical attendance and making it by the year, instead of by the visit. This was suggested some years ago by the writer and, as he showed, would involve not only no increase, but a positive saving of expense to the average family or individual patient. For a very moderate

sum per capita a doctor could engage to take care of a certain family and render whatever medical services were necessary during the year. This could be made to include a yearly, or, better still, a semi-annual, inspection of the house, business premises and schools occupied or attended by the members of the family, and a half-yearly or quarterly general overhauling of each individual, whether he seemed to need it or not. Then, when any one felt out of sorts, and one round of domestic remedies and a good night's rest failed to relieve, there would be felt no hesitation in consulting the physician and having it decided in ten minutes whether anything serious be the matter, or whether the case might safely be left to Nature.

CHAPTER III

THE ADVANTAGES OF ADIPOSE

IT is natural to desire to be different. Whatever we are, or have, we would like to be something else. The really desirable thing is always precisely what we have not got. Properly balanced, this instinct is one of the mainsprings of progress. A reasonable amount of discontent is wholesome, but an excess of it is the greatest murderer of happiness known. Nowhere is this tendency better exemplified than in the matter of our bodily proportions. The tall girl is quite sure that her giraffe-like proportions render her unduly conspicuous. The short man, in spite of his bantam-like brag and bluster, "that it is your small men, sir, that have made history," would give his ears to be tall. The thin woman compares her willowy outlines to a lath or a scantling, while the plump and comfortable maiden thinks of herself as a barrel or a flour-sack. So that we must be prepared to discount many of the complaints of the corpulent, of the wails of the well padded, as having little more substantial basis than this perverse tendency of human nature to hanker after the unattainable, to insist on placing the Delectable Land just below the horizon, or, as the Kerry peasant puts it, "back of the Beyant."

In at least half the cases of self-styled obesity which

clamor for relief and sympathy, their fatness, like the Emersonian's Boston, is not a place, but a state of mind. Easily another twenty-five per cent are chiefly concerned over their increased generosity of outline on account of the real or imaginary loss of sylphlike grace and slender symmetry; and if they could be reassured upon this point would not be a pin the worse, and often many points better, for their increase in weight. Not more than twenty-five per cent of those who bewail their amplitude of growth are in any serious way disabled or discomforted by it. Yet fully fifty per cent of the human race live in dread that they are or will some day become unwieldy, gross, "lubberly," "tubby," "pussy," "roly-poly," "mountains of fat," "human haystacks," or any one of the score of picturesque, metaphoric terms in which our vernacular is so fertile. To be "fat and scant o' breath" has been counted a reproach from the days of Falstaff, while "fatty" is as ancient and classic a term of derision as "Go up, thou bald-head."

There can be no doubt that an overwhelming, encumbering excess of adipose is a real infirmity, little short of a calamity, and the sufferings of those who are saddled with it are pathetically genuine. Yet I seriously doubt whether any one of an average range of acquaintance could number among his total circle more individuals who are afflicted in this way than could be counted on his ten fingers. Not more than five or ten persons in the thousand are distressingly and disablingly fat, and yet every one who begins to round out his curves and lay on flesh, be it ever so slightly, is

absolutely sure that he is destined to be one of those horrible examples. It is not so much what they are now that the corpulent complain of, as the dread they have of what they may grow into, as they get older. It is the calamities that never happen that turn our hair gray and grave the wrinkles. The plump have the same horror of even the mildest increase in weight that the Prohibitionist has of the first drink — for fear of what it may lead to.

One would think that fatness was a disease, a deadly plague, which, when once it had got foothold in the system, would go steadily on to destroy it, and whose earliest appearance and slightest symptoms were a danger signal and a cause for alarm. Few things could be further from the physiological fact. Nine times out of ten it is a mark, not of disease, but of health. It is an indication that the system, by good management and good housekeeping, has brought its expenditures within its income and is able to lay by a little, against a rainy day. Fat is Nature's savings bank, a hoard which can be drawn upon in times of scarcity or of need. Fat is in the animal economy what starch is in the vegetable — a reserve fuel without which continuous and sustained activity would be impossible. Whenever Nature wishes to provide for the future she lays up fat or starch. It is no mere accident that nine tenths of the bulk of the seeds of plants and of the yolks of the eggs of birds and of animals is composed of these two substances — provisions for the life that is to come.

For a long time fat was popularly regarded as a coarse, low-bred sort of substance, associated chiefly

with pigs and suet and whale blubber, and scientifically even as a low-grade tissue of small vitality, deposited chiefly beneath the skin as a combination of blanket and bacon for the body army. Now, however, the microscope and laboratory have taught us to regard it as one of the most indispensable and important tissues of the entire body. Every tissue in the body, except the teeth and nails, has to have it in some form or proportion if it is to be kept in health. "Fat-headed" or "fat-witted" is a term of reproach, yet nearly half of the bulk of our boasted brain and nerves is made up of a delicate, fatty substance known as *lecithin*. So intimate a part of their structure is it that the well-known sleep-producing, anæsthetic effects of ether and chloroform are believed to be due to their affinity for the fatty substances of the nerve centres. Fat lubricates the movements of the muscles, pads over the prominences of the bones so that the skin can play smoothly over them without stretching or cracking; the eyeballs rotate upon a cushion of fat; not only are the hollows of our bones filled with it (yellow marrow), but the spongy portions of them are packed with a so-called red marrow, also largely fat, in which some of the most vital and important processes of blood formation are carried out.

From a physiological point of view it is about as irrational to object to a fair amount, or even a moderate excess, of fat as it would be to too much muscle or too many brains, or, from a financial point of view, too much money in the bank. And in eight cases out of ten its accumulation will not go beyond comparatively

reasonable limits. Moreover, like money, where it can be accumulated, it can also be spent. Indeed, the purpose of its accumulation is for future spending, and this spending usually takes place within the lifetime of the individual. Nature is seldom so foolish as to be a miser and to accumulate for the mere pleasure of hoarding. In either case a margin is a good thing to have. You never have quite enough until you have a little too much.

Granting that fat in perfectly healthy conditions constitutes ten per cent of the body weight; what are the causes that determine its accumulation in excess of this? In animals this is simplicity itself, and fattening can be produced at will by increasing their food supply, particularly in starchy or fatty substances, without increasing their exercise. In a state of nature a change of this sort occurs every fall, and is of obvious value as a preparation for the cold and probable food scarcity of winter. There is, however, nothing prophetic about it, as the old argument of design was wont to hold, for it simply depends upon the fact that the trees and plants that have formed the habit of maturing their seeds at this time of year will leave offspring that have a chance of surviving the winter, and by feeding upon these fruits, grains, and nuts the animal most selfishly grows fat.

Our own species has almost completely lost this seasonal variation, its only survival being among farming populations, who, instead of laying on weight in the fall and losing it in the winter, gain weight in winter and lose it in spring. Animals in a state of nature and sav-

ages subsist usually in such a hand-to-mouth fashion and upon so narrow a dietetic margin that any marked increase of their food supply is promptly embraced as an opportunity of insuring themselves against the next famine by laying on fat. Civilized man, however, has had, for generations past, so comparatively equable a food supply the year around that he has, in large measure, lost this tendency to respond promptly to increases in his food by laying on flesh. Unless his appetite be first improved by life or exercise in the open air, travel, or change of scene, an increase of food is more likely to make him bilious than to fatten him. In fact, the relation to-day between fatness and feeding is far less intimate than is usually supposed. Individual peculiarity, hereditary tendencies, and special habits of life are much more apt to be concerned in it than either quantity or quality of food.

There is, however, one natural tendency to weight variation which still survives, and that is the inclination to gain weight with increasing years, after adult stature has been reached. The average healthy, vigorous man or woman, after reaching and holding a comparatively constant weight from the twenty-fifth year on for a decade or two, somewhere from the thirty-fifth to the fiftieth year is apt to show an inclination to put on from fifteen to thirty pounds of additional avoirdupois.

This is a perfectly normal, natural tendency, roughly parallel with the animal habit of getting fat in the fall in preparation for winter. Fifteen or twenty pounds of adipose is as valuable a protection against the frosts of

old age as it would be against the blasts of Boreas. So far from this tendency being regarded as anything abnormal or cause for uneasiness, it is, on the contrary, its absence which should cause us to worry.

If it does not occur we had better look about for the reason why. The stout and comfortable middle-aged man or woman will stand the worry and strain of middle life, and have at least a ten to twenty per cent better chance of survival to a good old age than the thin, spare, and nervous one. Like every natural accumulation of adipose, it is stored up only to be spent, and this fifteen to thirty pounds increase in the fourth or fifth decade is almost certain to be lost again in the sixth or seventh. "The shrunk shank" and "lean and slipper'd pantaloon" are as characteristic marks of the sixth Age of Man as the "fair round belly, with good capon lin'd," is of the fifth.

But it is not only in middle life that a fair degree of adipose — yes, of plain fatness — is both a sign of health and an asset for the future, but in earlier life as well. It is nearly twenty per cent safer to be ten pounds over than ten pounds under the normal or standard weight for your height at any age. The statistics of our insurance companies years ago revealed the curious fact that, while those applicants for insurance, of consumptive family history who were ten pounds or more under weight showed a marked susceptibility to the disease, those who were fortunate enough to be ten pounds or more over the standard weight showed, not only no higher susceptibility than the average of the community, but a slightly lower one.

In other words, an increase of ten pounds in weight had overbalanced the dangers of the hereditary tendency. One of our principal aims in the open-air treatment of consumption is to increase our patient's weight. When once he has fairly started to get fat we feel that half the first battle against the disease is over. Merely to find a young man or woman remarkably under weight for their height arouses a suspicion at once of possible tuberculosis.

One of the most successful methods of treating neurasthenia and nervous bankruptcy, the celebrated Weir Mitchell treatment, consists chiefly of rest and overfeeding, and its object is to make the patient fat. So that a growth of healthy fat up to or even slightly in excess of twenty per cent of your former weight is a protection against disease, a buffer against the shocks, and a shield against the darts and pin-pricks of fortune, a lubricator of all the frictions of life; it adds beauty to the beautiful and favor to the plain, and, in short, is an advantage in every way and a thing to be desired instead of dreaded, to be proud of instead of ashamed of.

My advice, therefore, to the vast majority of those who are anxious to lose weight, to get thin, is like "Punch's" famous advice to those about to get married: "*Don't.*" Your balance in the body bank may be a trifle unpoetic in the matter of waist-line, may show a regrettable preference for accumulating where the miners used to carry their gold, — under the belt, — but do not worry about it. You will have a good time spending it before very long, and most of the means

that you can adopt to get rid of it will do you far more harm than it ever will or can. Moreover, unlike the gold, it will float, and in the extreme emergency of shipwreck will act as a life-preserver instead of dragging you down to destruction, as so thrillingly described in the Shilling Shockers.

You may rid yourself at once of the spectre that fatness is usually either a sign of disease or a cause of disease. Statements to this effect are abroad on every hand, dating back to a most respectable antiquity, one of them, indeed, attributed to the great Father of Medicine. If he ever said it it is simply another addition to the numerous illustrations of the truth that great Jove himself sometimes nods. But in whatever mists of antiquity the saying may have started, it is little better than pure superstition, and its principal vogue at the present day is due to the shameless and unscrupulous exploitation of it in the columns of the newspapers by quacks and charlatans who have anti-fat remedies to sell. The business of these harpies, of course, is to fatten on the fears and superstitions of the people, and their jeremiads upon the dangers and terrors of fatness are as false as their claims to cure. The only weight their remedies can be relied upon to reduce is that of their victims' purse.

The vast majority of diseases are marked by thinness and emaciation, not by fatness and increase in weight; and fatness is one of the rarest symptoms of disease, instead of the commonest. A few conditions which diminish the power of the individual to take exercise, while at the same time the appetite and

powers of nutrition are not impaired, may be accompanied by an increase in weight. A few other conditions in which there is an imperfect elimination of waste, or in which mildly narcotic poisons are either produced in the body or, like alcohol, introduced into it from without, may, by a perversion of the chemical activities of the body, result in a general choking, so to speak, of combustion and a consequent accumulation of flabby fat. But all these disease conditions put together would not account for five per cent of the instances of positive corpulence which we meet, and in none of them does the mere increase of fatty tissue constitute a serious complication of the disease. There is another somewhat larger group of diseases, chiefly those involving the heart or the kidneys, in which there is a marked increase in body weight and bulk, such as is commonly known as "bloating," but this is due, not to an accumulation of fat, healthy or unhealthy, but simply of water in the tissues, a genuine *waterlogging* of the body-hulk.

Another ghastly delusion which has a wide circulation is that if ordinary healthy fat be allowed to go on accumulating it will finally "gather round the heart and choke you." This has about as much foundation as the equally widespread belief that if you lift up a guinea-pig by its tail its eyes will drop out. *Fat around the heart* and a *fatty heart* are as different as a horse-chestnut and a chestnut horse. A moderate increase of the normal adipose tissue upon the surface of the heart does occur in some cases of general obesity, but this does not interfere in any appreciable way with the

movements of the organ, except, to a slight degree, in the same way that it does those of the rest of the body — by increasing its weight and bulk. The real *fatty heart* is a degeneration or decay of the heart muscle itself, in the course of which its muscular substance is turned into fat, much the same as the curd of cheese is turned into fat in the process of ripening. This, of course, is an exceedingly serious disease condition, but has no relation whatever to the fatness or thinness of the individual in whom it occurs; in fact, is quite as often found in thin and emaciated people as in stout and corpulent ones.

But all this, while it may, to some degree, relieve their fears for the future and mitigate the horrors of their situation, is but scant comfort for the fifteen or twenty per cent of self-styled sufferers from obesity, who really have an accumulation of adipose excessive enough to interfere with both comfort and efficiency, and who can echo from the bottom of their hearts the aspiration of the poet: —

"Oh! that this too, too solid flesh would melt!"

What can be done for them? That will depend entirely upon the cause of their unwelcome riches — their swollen fortunes. With fully half of them this will be found to be something for which they are not in the least responsible and which, also, is almost entirely beyond their control — a natural tendency to lay on flesh, to increase in weight, upon a diet and under conditions in which the average individual would remain thin and slender. We must frankly admit that we know

little or nothing of the nature of this tendency any more than we do of the similar ones to grow tall or short, to have blue or brown eyes, to be blond or brunette, except that, like all of these, it is very apt to be hereditary.

A certain percentage of the members of some families, seldom more than twenty or thirty per cent, exhibit a well-marked tendency to grow stout and corpulent, some in young life, but more after a certain age has been reached. Our ability to modify this condition is almost as limited as our understanding of it. About all that can be done is to urge these unfortunate individuals to keep up as active habits of exercise and outdoor life as possible, to refrain from excess in the matter of sugar and starches, and, of course, avoid alcoholic beverages, and to encourage them to cultivate that cheerful tendency which, fortunately, usually accompanies this bodily habit, and try to make the best of it. It is perfectly idle for them to starve themselves, to drain their tissues with drastic cathartics, to poison themselves with obesity cures, to sweat themselves into a hectic, or to walk in the sun or work in the gymnasium to the verge of exhaustion. Let them clear their minds of the dread that their fat is ever going to seriously injure them; rid themselves of the haunting sense that this accumulation is due to either gluttony or laziness, and hence is something in itself disgraceful; eat a good variety of foods, particularly fresh vegetables, meat and acid fruits, and indulge in all the pleasurable kinds of exercise that they can find.

In short, stop punishing themselves for what is not

their own fault, and worrying over a condition which they cannot cure and which will, probably, one day disappear of itself, and they will find their lot a tolerable and usually even an enjoyable one. A small group in whom fatness is due to some definite disease condition, some perversion of the body metabolism, will have, of course, causations as varied as their diseases, and will each require individual treatment by a competent physician.

This leaves a considerable group of Falstaffs and "fair, fat, and forties," whose condition is due largely to the aggravation either of slight hereditary tendencies or of the normal weight increase of approaching middle life, by careless or bad habits on their part. The first and far the commonest cause of the trouble among these is the dropping of regular habits of exercise in the open air, such as is very apt to occur after the age of twenty-five in both men and women under modern conditions. Conventional and commercial influences have about equal weight.

The boy who has completed his period of studies, of apprenticeship, and of experimentation, and settled down to his trade, his business, or his profession, is taught that it is beneath his dignity and will interfere with his reputation for steadiness and reliability in the community to continue his baseball, football, or tennis, and, except at annual or semi-annual intervals, his sport with rod, gun, and canoe. At the same time the settling down to regular office or work hours and the cares of business and his newly established family leave him little time or strength for these mere

amusements and luxuries, as they are commonly regarded.

Naturally he is very apt to do one of three things: to lose his appetite altogether and become dyspeptic, nervous, and restless, which is the worst; or, in some measure, to adjust himself to his new surroundings, moderate his appetite, accustom himself to bad air and too little of it, both day and night, and drop into a semi-narcotized, blind-horse-in-a-mill frame of body and mind, which is the common lot; or to hang on to his appetite and his enjoyments, only changing the latter from outdoor to indoor ones, and in consequence begin to get fat and bodily sluggish. This increase in weight, of course, makes him more disinclined for outdoor exertion, and whenever the eating of a reasonable, healthy amount of food, followed by no decent amount of exercise to burn it up, makes him feel bilious, he puts the whole blame of his discomfort either upon his fatness or the poor, innocent food, instead of his bad physical habits which have caused the whole trouble.

In like manner the girl, even if she has been blessed with a mother sensible enough to let her grow up like a tomboy and do everything her brothers do, when she passes her seventeenth year begins to be preached and dinned at that real exercise and sports of all sorts are unladylike and unbecoming, and is taught to repress all her healthiest instincts for fear they may possibly be considered "bad form." About the time that this mental strait-jacket is being put on, a physical one of steel and whalebone is applied to her waist, her feet are cramped into pointed-toed, high-heeled absurdities

named shoes, her limbs are encumbered by a ridiculous profusion of crippling skirts, and she is fairly broken in to that condition of mental and bodily slavery to convention and precedent which will encumber the remainder of her life. No wonder women long to be emancipated — but they need other liberations besides the ballot.

A little later in life another influence adds its weight. She is now married and settled for life, and she proceeds to look the part. She will soon be gray and middle-aged, she no longer has to look about for a husband, her children will accept her appearance as a matter of course; what is the use of pretending to be young and sprightly when you are forty and bound to be fat? Fortunately many of these absurdities are being swept out of our brains into the ash-barrel, where they belong. The present generation has largely emancipated itself, and the rising generation is growing up free from their stifling and benumbing influence, and, as a consequence, already women are no longer becoming fat and frumpish at forty — no, nor old and useless at sixty. In another generation we shall all be young and active and happy until we die.

Contrary to popular impression, and, indeed, to former medical teachings, positive laziness, actual gluttony, or even over-eating have really very little to do with fatness. Fully one half of those who are excessively fat eat no more than the average, and many of them much less. There are occasionally errors in the quality and kind of food, mainly in the direction of taking too much starch or sugar. An excess of fat in

the diet is seldom to blame for obesity. Indeed, most of the rational diets for the reduction of obesity, in suitable cases, make fat an important factor because such small amounts of it will give the requisite amount of nutrition and fuel value and at the same time a sense of satisfaction to the appetite such as neither starches nor meats will give, except in much larger amounts.

Finally, what is to be done for the cure of this condition where it demands one? Remembering that fat in itself is in no way injurious, but rather a sign of health and a valuable store of reserve material for the body, the first principle to be laid down is that our aim should be not so much to get rid of fat, or reduce our weight, as to train ourselves to carry what we have with comfort and efficiency. The chief and, indeed, only safe remedy is vigorous, active, outdoor habits of life. As everywhere else, the best cure is prevention. Do not let yourself become fat, even at forty, and you will have little trouble; keep up your boyish and girlish sports and pleasures; plan your day's work so as to get from two to five miles' walk or its equivalent in some form of exercise every day and double that on Saturday or Sunday (the apparent loss of time will repay you double in increased vigor and improved quality of your work); and even if you do tend to become a trifle more generous in your outline and ample in your girth after forty, you will never be conscious of it, except when you look in the glass. Many a man has had practical illustration of this fact by going off on a long and arduous hunting or fishing trip in the north woods for

the purpose of reducing his weight. He comes back feeling fit for anything; all his shortness of breath has disappeared; he is good for twenty miles a day across the roughest country; his appetite never was better; his eye is bright and his head is clear; he has lost nearly three inches in waist girth and half an inch in the neck; yet when he steps on the scales, he not only has not lost an ounce of actual weight, but has gained ten pounds. He has simply distributed his weight better and built up the muscle to carry it with comfort.

This should be the aim of most of our obesity sufferers. Only a small per cent, if they will throw off their tight boots and crippling clothing, will emancipate themselves from the slavery of the demands of society or of office hours, and live a vigorous, natural, wholesome life, but will find they will either secure an appreciable reduction in weight or such an improved distribution of it and increased strength and vigor as to be able to carry it about practically without discomfort or inconvenience. A moderate system of empty-handed exercises in the indoor gymnasium, five to ten minutes' vigorous wind-milling night and morning just after the bath, including such exercises as bend the back, stretching to their utmost the muscles of their waist line, both of the sides, and of the abdomen, will do much to help. But violent spurts of overwork in a hot, stuffy gymnasium, or fierce, heart-breaking runs across the country, or violent attempts to rapidly reduce flesh in a short time, are both dangerous in themselves, as tending to throw strain upon the heart which is already ageing and stiffening, and practically

useless in the long run, because they cannot be kept up beyond a temporary spurt, and as soon as they are dropped, the weight returns to its former level.

There is no necessary connection whatever between leanness and efficiency and fat and clumsiness. Many of the most vigorous, energetic, and efficient of men exceed even Speaker Reed's standard of a gentleman — two hundred and fifty pounds. A stupid individual who grows stout does not add anything to his mental agility in the process; and the fat fool, in appearance, at least, has added an equal number of pounds to his folly. But that men or women alter notably either their abilities or their efficiency by adding thirty, forty, or even seventy pounds to their avoirdupois is a position which would be utterly untenable.

One word as to the dangers of some of the methods proposed to cure — most of the patent ones, of course, are arrant, notorious frauds. A few of them really do "work" mainly by virtue of being or containing dangerous poisons which reduce the weight of the body much in the same way as would an attack of typhoid fever. The vast majority of them, however, are ridiculously ineffective, composed often of the simplest and cheapest of substances like common salt, baking-soda, flour, or chalk. Such of them as have acquired any reputation whatever depend largely for this upon the fact, already alluded to, that in nine tenths of all cases the accumulation of fat occurring in middle life disappears of its own accord in later life.

Those who are so blest insist upon regarding it as a calamity, and try all sorts of more or less absurd remedies

for its cure. They keep at it until the tide in the affairs of men is reached at which their fat begins to disappear, and then the last remedy which they happen to be taking at the time gets the credit.

Much the same may be said of most of the various modifications of diet which are advised for the reduction of weight. The majority of them are harmless, but a few are dangerous to a marked degree. All of them, practically, are forms of starvation, more or less modified. If this process be kept within reasonable limits a certain amount of the body reserve can be drawn upon and burned, and the weight of the individual reduced without any particular damage to health or to efficiency. Such reductions, however, are not likely to be permanent, nor can the diet upon which they are produced usually be indefinitely persisted in without impairing nutrition and working-power. Fat is unlike a balance in a bank in one sense, that, as a rule, it can be drawn upon only in an emergency, such as illness, injury, or enforced starvation in famine. To attempt to produce a condition of artificial famine by reducing the diet will reduce the weight of the obese in a majority of cases, but it will often do so at the expense of both their health and their comfort. The amount that a man must eat depends upon the amount of work that he has to do. Like the steam engine, for every foot-pound of energy expended from five to ten pounds of energy must be generated in his furnace under his boiler. No matter how fat he may be, he cannot stint himself markedly of this amount for prolonged periods without injury. Starvation is a de-

cidedly dangerous game, and he who plays it must have either great skill or unusual luck to avoid injury in the long run.

Most special diets recommended for the reduction of weight are merely starvation in disguise. The method of avoiding all kinds of liquid at meals simply means that by this method you choke your appetite at a much earlier period than you would if you accompanied your meal with plenty of fluid. The other much-vaunted method, of eating only one dish at each meal and as much of that as you want, depends upon precisely the same principle. Any single food, no matter how savory or attractive, palls upon the appetite and extinguishes it long before an adequate amount of food has been taken for the purpose of nutrition. Similarly, the trick of taking small amounts of food at frequent intervals cheats the appetite into a delusion of satisfaction with a totally inadequate amount of nutritive value.

Most of these systems may be judged by their results. If, while they are reducing weight, they produce sensations of restlessness, craving, irritability, and sleeplessness, they are doing the individual far more harm than the few extra pounds of harmless adipose which they are removing would ever do him.

The danger of fat is not in the adipose tissue itself, but in the man or woman who carries it, and the absurd things they will do to get rid of it.

CHAPTER IV

DYSPEPSIA

EVERYBODY knows, of course, that our American digestion is the worst in the world. But we are beginning to discover, in these Darwinian days, that while what everybody feels is pretty likely to be right, what everybody knows is often apt not to be so. Our hearts are pretty likely to be right, but our heads, — the less said about them the better, and our stomachs, — well, that remains to be seen. They certainly resemble our hearts much more than they do our heads. We are soundly convinced that we are a nation of dyspeptics. We were told that years ago by one Thomas Carlyle, and he ought to have known, for he had the worst case of it himself ever seen in captivity. In fact, he was one walking, animated indigestion, and incidentally grew it on the usual food and favorite culture medium of dyspepsia, Scotch oatmeal. Talk of the scholars, theologians, and statesmen who were bred on that cheerful cereal, they were not one tenth as numerous as the dyspeptics it produced. In fact, not a little of the dourness and Calvinism of Scotch scholars and divines was born of it, and the melancholy induced by it could only be neutralized by the fiery exhilaration of the other brand of extract of cereal for which Scotland is famous. Was n't it Bishop Vincent who said, "Most

people think themselves religious when they 're only bilious"?

Practically every visitor who has come to our shores since the time of Dickens has echoed this verdict upon the national stomach, and the fewer weeks he stayed the more positive was his dictum, until we have come meekly to accept it as an article of faith, amounting almost to an axiom, that our national gastronomic horse-power is exceedingly and distressingly low. We have never been reckoned lacking in the saving virtue of a fairly good opinion of ourselves, yet we meekly listen to Hans Breitmann boasting of his placidity, his self-control, and breadth of beam, based on his matchless digestion, or to Timothy Tugmutton pluming himself upon his ruddy complexion, unhurried movements, and peaceful length of days as contrasted with our haggard nervousness and life-shortening hustle and excitability due to his eupepsia and our dyspepsia, respectively.

It furnishes one of the most beautiful illustrations of how little what a man believes about his health has to do with his actual physical condition, that in spite of our implicit and pessimistic belief that our digestions had gone to the dogs and our nerves were rapidly following their example, we have made not only the most astonishing national growth, in our century of dyspepsia and neurasthenia, that ever was known in the world's history, but that the native-born American of the second or third generation exceeds at all ages, from infancy upward, in height, weight, and chest girth, any other nation or race on the face of the globe. Instead of our neurasthenic and dyspeptic population becoming an

easy prey to the eupeptic and vigorous nations of Europe, the bitterest wail which goes up from London to Constantinople and from Naples to Stockholm is that Europe is becoming "Americanized" in business, in transportation, and even in politics and social life and forms of government.

As for nervousness and lack of judgment and national hysteria, if anything can be found to match the hystero-epilepsy of even the most cultured and impassive classes of the English people over the rank bugaboo of the "German Invasion," or the riotous excitement and mediæval race hatreds of France over the Dreyfus case, or the panic-stricken terror of the German financiers over the Agadir incident and its complications, it would be hard to discover it in the last half century of American history. We can really begin to plume ourselves on being one of the coolest and least excitable nations of modern times, and can congratulate ourselves upon having not merely one of the oldest, but the stablest government in the civilized world — if that be altogether a matter of congratulation.

American dyspepsia, judging by its results, would seem to be a pretty good remedy to have in the family in case of sickness. It is not unlike Grant's whiskey, in the classic story of some meddlesome busybodies who kept bringing accounts to Lincoln, during the famous Vicksburg campaign, of Grant's alleged drunkenness and addiction to liquor. He stood it as long as he could, and finally burst out with, "I wish I could get a jug of Grant's whiskey and send it to some of the other generals on this side of the mountains."

As a matter of fact, American dyspepsia, like many national traits observed by new-come travelers, was largely imaginary and due chiefly to the freedom and frankness and lack of reserve with which the free-born American of those days was willing to discuss his symptoms in public. The German or Englishman suffers just as much from it, only it is against his social and moral code to eviscerate himself in public. But just wait until he gets you into a secluded corner of the smoking room, and breaks through the frozen crust which surrounds him, and he will talk to you by the hour about his private indigestion.

Another thing which helped to start the fairy tale — and fairy tales need only a start to be assured of immortality — was the astonishing, and to the tenderfoot, appalling habit of profuse and accurate expectoration which marked the untamed free-born American citizen of that earlier day. The period at which a boy was able to "spit over his chin" marked his emergence into manhood, and expert operators were as proud of the accuracy of their aim at any given spittoon, up to twenty feet, as they were of their marksmanship with the famous Kentucky deer rifle. Surely a stomach which was being robbed of pints of the secretion of its salivary glands daily, could not possibly be in anything like a healthy and prosperous condition. The inevitable conclusion was never more crisply put than by the brusque and immortal Dr. John Abernethy, who, when consulted by an attaché of the American legation in London about his dyspepsia, summed up as his final advice, "Keep for the digestion of your food the

saliva which you waste upon your carpets, and you will be well, Sir."

As a matter of fact, there is nothing the matter with the American stomach. On the contrary, it does its work better than any other stomach in the world, because it is better fed, supplied at more regular intervals with larger quantities of more nutritious foods than any other national stomach in the world. The digestion, like the affection of the Queen Mother in Hamlet, "grows by what it feeds on." The most serious malady that the stomach can suffer from is emptiness, and that, thank Heaven! the American stomach has never experienced and never will — no matter whom it has to eat to fill itself.

The position of the stomach in the body politic is really one of remarkable ancestral dignity, and present responsibility. Yet we treat it as if it were a scullery maid. It is the Cinderella of the body household, sitting in the half-light of the basement kitchen, down in the cellar among the greasy pots and pans, loaded with all the dirty work of the house, while its idle step-sisters, the lips and the eyelids and the hair, go forth to flaunt themselves in the sunshine and dance under the chandeliers. It is not even considered polite to mention its name in public except when we want to complain of it or berate it for its shortcomings.

Yet if there be any place in the body which is the proper and logical seat of the soul, it is the stomach. When we lay our hand upon our heart in sign of utmost loyalty and devotion, we are really laying it upon the cardiac end of our stomach — but, of course,

"heart," sounds better and more poetical. When we are cut to the heart by ingratitude or treason, the anatomical structures which are really lacerated are the terminal filaments of the solar plexus in the mucous membrane of the posterior wall of the stomach. And every child knows where the famous knock-out, or solar plexus, blow of our most popular and intellectual form of debating is landed. A man may be cross-eyed or bow-legged, or asthmatic, or half paralyzed, or racked with all the agonies of rheumatism or neuralgia, or half eaten alive by cancer, and still be a man; but the noblest hero or most sublime saint in the world is no better than a wisp of wet dish-rag when he is sick at his stomach. The martyr may sing songs of lofty devotion while being burned at the stake, but fancy any one directing a battle or writing a poem when he was sea-sick!

Eyes, ears, hands, and feet are parts of us, but they belong to us, not we to them. We speak, and they obey. But the stomach is "US," the self of our inmost self, and when it speaks it is with the still, small voice that compels obedience. And why should n't it? For all things in the realm of nature there is a reason.

From a biologic and dynamic point of view, the stomach is far and away our most important and most fundamental organ. Biologically, it is the oldest organ and best friend we have. Dynamically, it is the socket into which is inserted the plug of the wire that connects us with the world dynamo, with the power-house of the universe. Physically considered, we are simply proteid sponges, in human shape, filled with sea water,

galvanized into life by the great sun currents which flow into us through our sole and only port of entry for the energy of the outside world, the stomach. If we prefer to regard ourselves as rosy clouds of water mist, shot through and glowing with the sunlight of the universe, called up by it from the blue depths of the sea of being in the pearly dawn of our life, and sinking peacefully to rest in it again in the crimson sunset or purple twilight of our little day, — well, you pay your money and you take your choice, "It's all the same in — chemistry."

Why is a stomach, anyway? Listen, and you shall hear. We were not always thus. In the happy childhood of the world, when life first began, ere Nature tried her 'prentice hand on man, we really lived the Simple Life — though we never will again: it takes too much time. We floated happy and careless in the tepid, brackish waters of the marshy lagoons, brainless, armless, legless, careless little "gobs" of clear animal jelly, more like tiny gumdrops without the sugar than anything else, sucking in nourishment at every pore. We did not worry about our daily bread, because it was supplied to us fresh and fresh every ten minutes, nor were we aware that the world owed us a living, since we never had the slightest difficulty in collecting it. We toiled not, but we did occasionally spin — round and round, by means of the "lashers" on our surface.

We were not quite so simple as we looked. Though we had no eyes, it was because we were all eye and could perceive the light waves with every pin-point of our surface, likewise the sound waves, so that we were

literally, as we have often been metaphorically, accused of being, at a later stage of our development, — all eyes and ears. We had no legs, because we were able to make a leg on ten minutes' notice at any time by simply shoving out one of our corners into a tentacle as needed.

We had no stomach, because we were all stomach; and our method of engulfing food was to simply sidle up to it, half pour, half curl ourselves affectionately round it, suck out of it what might be digestible, and then gently pour away from it again, leaving the insoluble remnants outside the breastworks. No chance for indigestion, for colic, for appendicitis! What would we not give to return to such happy and dignified simplicity now-a-days! We were like the angels in Heaven, neither digesting nor indigesting our food, neither marrying nor giving in marriage.

As far as our knowledge of evil or of suffering was concerned, we were in the position of the rural justice of the peace who had just been elected to office and was making his inaugural address. He wound up his remarks with the declaration that, inasmuch as it had come to his ears that there had been much complaint and accusation of partiality in the judgments formerly rendered in that court under his predecessor, he wished it clearly and distinctly understood, once and for all, that during his administration neither partiality nor impartiality would be displayed in that court!

By and by it occurred to our gumdrop ancestor that there was virtue in the division of labor, and beginning with the most important things first, he set aside a

little area of his surface exclusively for purposes of engulfing and sucking the nutrition out of food scraps. In order to hold the food in contact with itself, this little area first hollowed itself into a dimple and later into a pouch, and behold! the father of all organs and creator of man, the stomach, was born.

As there was no way of getting rid of any remnants which could not be melted save by the rather clumsy and troublesome process of the pouch turning itself inside out, it soon became desirable to have some sort of inspection service established at the mouth of the pouch, and as most things which are fit to eat smell good — even to this day — a couple of little spots in the skin of the creature, just above the mouth, began to specialize in the discrimination of odors and sank into pits, and thus formed the nostrils and olfactory nerves. At the same time a mechanism for barring out that which was bad became necessary, the band of living stuff round the mouth turned itself into a ring of muscle, and the lips and jaws were born. To control the small pits grew up a little nerve knot, the olfactory, and to direct the mouth ring, another. Then from the union of these two, in order that they might work in harmony, was born a most illustrious child, our lordly brain.

Next came the necessity of testing the food by sense of sight and seeing the dangers into which the body was led in pursuit of it, and two other little spots upon the surface above the mouth specialized on the light waves, and sinking into the body mass, became the eyes and the optic nerves. A little later the sense of

hearing was demanded for the same purpose, and two other little sensitive patches on the skin devoted themselves to the sound waves, shut themselves off and sank into the deepest parts of the head end of the creature and became the ears and the auditory nerves. All these were successively coupled up with the nose-jaw combination.

The mouth end of the creature became the head end because it was most frequently poked into danger. Then a department of superintendence of all these different and occasionally conflicting outlook departments was demanded, and the cerebral hemispheres or upper brain budded out. The hemispheres have since become two thirds of the brain total, but to this day the basal structure and main stem of the most huge and complicated human brain are composed of, first and frontmost, a pair of nose lobes, and a pair of jaw lobes, or ganglia, then a pair of eye lobes, then the ear lobes, and finally, the balancing lobes or cerebellum.

The stomach literally *made* the brain for its own purposes and use, and from a biological point of view the most highly specialized animal creature, man himself, is nothing but a cast of his own stomach. It is no wonder that we think much about our stomach and squander gallons of printer's ink and untold cyclones of breath over our favorite foods and schemes of dieting, and what will agree with us, and gloat over the vagaries of our digestion. As a man digesteth in his stomach, so is he.

It is not always safe to judge either by appearances or even by feelings. Though we hear more talk about

indigestion and of distress after eating and of "misery" in the epigastric region, than of any other evil that flesh is heir to, actual, definite, tangible disease of the stomach is one of the rarest of all maladies. Our stomach is not only our oldest organ, but our most reliable, our most resistant and our best behaved. Nearly half the discomforts and disturbances which we put down as diseases of the stomach are really unselfish efforts which it is making to protect the entire body in general or other organs in particular.

Nine tenths of all forms of so-called indigestion are not due to the condition of the stomach at all, but are caused by influences operating in other parts of the food tube, or even in entirely separate and foreign parts of the body, miles away from it, physiologically speaking. To attempt to cure indigestion, dyspepsia, and discomfort after eating by dieting, or by methods of treatment directed to the stomach alone, is absurd and irrational. The reason why the stomach apparently suffers so much is on account of its unselfish devotion to the large family of children which it has produced and reared, namely, the rest of the organs of the body. Metaphorically speaking, its "heart is too big for its body," and that's what gets it into trouble.

It is not by accident that the stomach lies at the geographical centre of our personal universe, at the intersection of our axis and our equator, as it were. Despised and half ostracized as it is, it is still emphatically "the works" of the body, has more questions referred to it for settlement than any other organ in the body, more messages passing through it, and gives far

more orders to the haughty brain than it takes from it. Every emotion, every feeling that affects the body is reflected in the stomach as in a looking-glass, and vice versa, the states of our digestion affect our mental and emotional states more than any other influence of the world. We may think with our brains, but we decide with our stomachs, and two thirds of the lofty emotions which thrill our bosoms and glow in our hearts, as we fondly imagine, are really vibrations in the plexus of Auerbach just under our gastric mucosa. When our "bosoms swell" it is usually with gas in the stomach or with wind in the lungs. When we remember that it mothers and fusses over all the rest of the body like a hen with one duckling, in addition to digesting all the horrible messes and choice collections of junk and trash which we shovel into it in the shape of food, is it any wonder that it grumbles pretty often or even goes on a strike occasionally?

The most distinguishing characteristic of the stomach after its wonderful vigor and its efficiency is its extreme good nature. Every organ in the body and every faculty in the mind can come to it with its troubles and receive its sympathy and assistance. It is the mouthpiece, the spokesman for every disaffection in the body and sympathizes with every grievance and insult from Welsh rarebits to disappointments in love.

The first and most frequent danger signal of the body is pain, but the next and far more arresting and fundamental is nausea. We hear of the massacre of women and babies by Indians and it turns us sick and faint; the end of a log that we are handling slips and

crushes one of our toes, and we sit down hurriedly, white and trembling and nauseated; we stumble over a dead body in a dark hallway or smell the heavy, sickly-sweet odor of blood, and we are instantly sick at our stomachs; we are knocked down and stunned by a blow on the head, and the moment we come to, we begin vomiting furiously; we hear a tale of tragedy and suffering, and our "bowels yearn" and our diaphragm vibrates tremulously.

Why should the stomach take such an extraordinary and irrepressible interest in all these troubles which concern it not in the least and in which its well-meant attempts at consolation are not only useless but a source of further embarrassment and distress? It is one of the most curious problems of biology. The only explanation that can be offered that has even a show of reasonableness is that the tendency is ancestral and a part of what may be termed the memory of our tissues.

The stomach being, as we have seen, our earliest and oldest organ and our chief port of communication with the outside world, our most serious primitive disturbances were naturally digestive ones from poisonous or improper food. Obviously, when we were all stomach the only pain or malady that we could suffer from was stomach-ache. And the quickest and most alphabetic method of relieving it was to empty the stomach, so that the quaint and childishly illogical habit still clings to us, and we attempt to relieve our headaches, our heartaches and the wounds to our vanity or self-esteem by the old-fashioned method which so often

and so effectively "cleanses the stuffed bosom of its perilous stuff."

The fact remains that whenever we are at our wits' end and can't think of anything else to do, we follow the old whist rule, "when in doubt play trumps" — and play Jonah.

The other explanation is much more prosaic and matter of fact and therefore probably more likely to be correct. That is that the stomach alone of the entire ten yards or more of the food tube has any nerves connecting it directly with the brain, all the rest of the intestines being supplied by a net-work, known as the sympathetic nerve system, which only indirectly and in a roundabout way, through the spinal cord, connects it with the centre. The stomach, therefore, being the only part of the food tube which is, strictly speaking, able to feel, it becomes the mouthpiece, or from another point of view, the scapegoat for the entire alimentary canal. As a matter of fact, many, if not most of the distresses which we term crudely stomach-ache or pain in the stomach are really situated in the coils of the intestine and not in the stomach itself at all. It is also established as a matter of oft-tested medical and surgical experience that the two most sensitive structures in the body are the skin and the stomach. When the surgeon has cut through the skin, the most painful part of an abdominal operation is over, until he comes to touch the surface of the stomach.

What then are the causes of that most familiar and frequent disturbance — after headache — which the human mechanism suffers from, indigestion or dys-

pepsia? Though indigestion is Latin and dyspepsia is Greek for one and the same discomfort, it is well for practical purposes to make a distinction between the two terms, a distinction based merely upon their duration and persistence. As a mere rule-of-thumb distinction for purposes of practical convenience we term those gastric disturbances which occur fairly promptly after eating and disappear as soon as the particular food swallowed has been disposed of, as indigestion, while those forms of disturbance which have no special relation to meal hours and which either persist or recur at fairly frequent intervals, regardless of the kind or amount of food taken, we term dyspepsia. Indigestion, in short, is an accident, dyspepsia a habit.

The distinction, crude though it be, is of great practical value, because it corresponds pretty closely to a wide difference in causation. The vast majority of attacks of indigestion are due, as might be expected, to the food eaten and may be cured by getting rid of the offending meal, and prevented by greater care and cleanliness and more rigid inspection of food, or perhaps the avoidance of the particular thing which disagrees. Obviously, there may be as many different causes for indigestion as there are qualities and kinds of food, but fortunately, the problem is slowly but steadily simplifying itself in these later years in a somewhat unexpected manner. Up to twenty-five or thirty years ago, it was generally believed in both popular and medical systems of dieting that there were great and serious differences in digestibility and wholesomeness between different kinds of food; that one food was

suited to a particular age and sex while another equally nutritious food was utterly unsuited, and that we had to be extremely careful not merely of what we ate even of perfectly wholesome foods, but also of the combinations in which we devoured them. Now, however, we are practically agreed, with the exception of a few dyspeptic eccentrics, that the only really important difference between foods is in their fuel value, and that the healthy stomach ought to be, and as a matter of fact is, abundantly able to digest at least ninety per cent of all the dishes placed upon our tables, providing that these contain adequate fuel value or calories, and are not inordinately bulky or fibrous. If a stomach cannot digest pork, for instance, the fault is not with the pork, but with the stomach, and its possessor ought to be ashamed of it, or rather of his bad habits of living which have brought him into such a weak and enfeebled condition.

In fact, such is our biological confidence in the stomach that our advice in regard to kinds of food is nearly that of the archbishop of the Middle Ages, who, when his soldiers were about to massacre a large congregation of heretics in his diocese, was asked what should be done to spare a considerable number of the faithful who had come to the meeting out of sheer curiosity. He replied, devoutly, "Kill all. God will recognize his own." Our twentieth century dietetic advice is to eat everything in reason, and trust the stomach.

"But," says some one at once, "why then do foods disagree with us, as every one has had bitter and convincing evidence that they do?" Chiefly for two rea-

sons, — one great and almost all-embracing and the other very small. The first and far commonest and most important is that foods, when they are eaten, are in various stages of putrefaction or decay, or what is colloquially termed bad or spoiled. The second and far minor reason is that certain individuals have especial susceptibility or idiosyncrasies toward certain articles of food which are perfectly wholesome to all the rest of the community. It is not too much to say that nine tenths of all our cases of acute indigestion, acute gastritis, or gastric catarrh or colic or biliousness or diarrhœa, to say nothing of cholera nostra, dysentery, and typhoid fever are due not to the kind or amount or combinations of food eaten but simply and solely to its decayed, fermented, or putrefied condition. In fact, a large share of our most acute attacks of indigestion and of bowel disturbances are due to the multiplication in our own alimentary canal of bacteria and other germs or parasites introduced in the food which we have swallowed, and most of our attacks even of so-called food poisoning or ptomaine poisoning are due not so much to poisonous substances already formed in the foods, though these may be dangerous enough, but to the further multiplication and growth in our stomachs and intestines of the bacteria which have produced these putrefactions or spoilings. In fine, three fourths of our indigestion is due not to the stomach nor to the kind or amount of food eaten but to our carelessness, stupidity, or ignorance in eating filth and poison in place of food. Incessant watchfulness and an intense, vivid, and wide-awake horror of dirt or every

appearance thereof in our foods, in our kitchens, and upon our tables will cure by preventing nine tenths of all attacks of indigestion.

It was not by accident that Nature made our sense of smell the first and most fundamental of our senses, and it still remains to this day. Nothing will carry us back to the happy days of our childhood like the fragrance of new-mown hay or the scent of wild-grape blossoms along dusky, moonlit, woodland roads. If we would submit to the judgment of that most prominent and important of our features, the nose, every mouthful of food before we swallowed it, and every breath of air before we drew it into our lungs, and acted promptly on its judgment, we should avoid at least half of all the evils that the flesh is heir to, either gastric, intestinal, or pulmonary. Eternal sniffing is the price of health. Swallow only that which smells good and tastes good, and unhesitatingly reject all that does not, no matter where you are. Keep on until you feel that you have enough, and you may trust the stomach to do the rest. This is the only "sure cure" for indigestion.

The other cause of indigestion, individual susceptibility, though far, far rarer, is at times exceedingly troublesome because it seems so unreasonable. "Why, under Heaven," protests the sufferer, "should anything that tastes as good as strawberries and is perfectly wholesome and right for everybody else make my tongue swell, or my stomach burn, or my skin break out all over in hives? It is ridiculous! It is n't fair, and I won't stand it!" But unfortunately facts are stubborn things, and all that can be said in such

cases is what was said by the oldest mother in Israel in the cannibal village in the South Sea Islands when they were cooking the missionary and his cork leg would float up to the top of the kettle, "Some pork *will* bile that way." The susceptibility exists and there is no use arguing or fighting against it, although I would not advise anybody to give up strawberries short of at least twenty trials under every possible variety of experimental condition. If after careful and intelligent testing you find to your own satisfaction that strawberries or cherries or bananas or oranges or clams or oysters or lobsters or cucumbers or melons or eggs or mutton or onions or cabbage or tea or coffee positively do not agree with you, just let them alone. There are plenty of other good things left.

The one thing that you must *not* do is to run amuck and start a crusade against the further use of these harmless and wholesome articles of diet by the rest of the world just because they do not happen to agree with you. Because *you* are bilious shall there be no more cakes and ale? Three fourths of the food fads of the world are started by crooks and cranks and supported by invalids. It may usually be said with truth about the particular *fons et origo mali*, whether pork or sugar or red meat or salt or coffee, what was said by the French cynic about alcohol, that it certainly was a powerful stimulant, for it excited those who didn't take it almost as much as those who did. If your stomach or your head or your liver is too weak to stand any one of these things, for Heaven's sake don't brag of your defect in public.

So far from indigestion being in any sense a modern malady, it is one of the oldest in history, and instead of increasing, it is rapidly and notably diminishing and becoming rarer under civilization.

We have a cynical old proverb that God made food, but the devil made cooks, and many other like ones to the same effect, and we denounce the cooking stove and the frying pan as one of the causes of modern degeneracy, but we forget that they both perform one service of incalculable value and that is that they kill the bugs in the food before it gets into our stomachs. This service outweighs tenfold any trifling harm that may have been done to our digestions.

Indeed, unexpected as it may seem, this was probably one of the primal causes for the application of fire to food and the invention of the art of cooking. The lower down we go in the scale of civilization, the more frequent and furious and fatal become attacks of indigestion and diarrhœa, due to the eating of poisonous or putrefied food.

We make a terrible fuss about a tape worm when we happen to have one now-a-days, but even within the memory of the present generation they have become from a relatively common inmate one of the rarest inhabitants of our alimentary canals, and the quack doctors who go about selling vermifuges will pay as much as twenty-five or even fifty dollars for a first-class twenty-foot specimen to exhibit as one of their trophies to the gaping crowds.

Most savages and semi-barbarous people have from one to two tape worms and a couple of score of round

worms, and a small zoölogical garden of other assorted kinds of wrigglers as regular parlor boarders, and in case of doubt as to the precise tribe to which a given Akka or Batwa belongs, the particular species of intestinal parasite which inhabits him can be relied upon as a valuable means of identification. Then we talk with bated breath and horror of a few score cases of trichinæ a year in our ninety millions of inhabitants.

No wonder that sanitarians are insisting upon food inspection, and again Food Inspection, and always FOOD INSPECTION, as the most important and fundamental step in our campaign for health. It is not the length of time that even perishable foods are kept that makes them really dangerous for human consumption, it is the filthy, careless, ignorant way in which they have been sprinkled with decaying fertilizer, exposed to the dust of the streets, which is chiefly powdered horse manure, crawled over by flies which have come from every garbage can and refuse heap and privy in the neighborhood, handled by diseased hands or sprinkled with water containing typhoid or summer dysentery germs. If we keep our food clean, just clean, surgically clean, we shall cut out three fourths, yes nine tenths, of all our disturbances of the digestion at one stroke.

So permanent and almost exclusive a part do bugs of one sort or another play in most attacks of indigestion, that it is no longer considered necessary or even advisable to discontinue taking food, providing that food be clean and sound, until the attack has entirely subsided. Starvation is no cure; seldom even a remedy. Indeed, the very time the body most needs

an abundant supply of wholesome, digestible food will be found to be when it is engaged in fighting desperately against an attack of deadly germs introduced in some rotting meat or decaying vegetable. And we not only feed fevers, but we feed ptomaine poisonings and attacks of diarrhœa, and a liberal dose of sound, wholesome food is often one of the best intestinal antiseptics.

The popular belief that savages in a state of nature have perfect digestions, irreproachable teeth, and are models of physical vigor, and perfect generally, is the purest of fairy tales, and has not the shadow of respectable evidence to support it, barely more than the similar delusion that our ancestors of a hundred or two hundred years ago were taller, stronger, and more eupeptic than we are. All through savagery, through barbarism and the lower half of civilization, famines were of as frequent occurrence as bank panics are now, and coarse, filthy, half putrid food was ravenously devoured for at least three or four months out of each year by seven tenths of the people, with a perfectly enormous death rate from gastric and intestinal diseases.

As recently as two hundred and fifty years ago scurvy, a disease due solely to eating half-putrid salt meat and fish and spoiled flour and meal, and the absence of fresh vegetables and fresh fruit, raged in all the navies of Europe and devastated scores of inland country districts as well.

Three great factors contribute most of all to indigestion, and what we may term elementary ill health:

scarcity of food, particularly at certain seasons of the year, and its corollary, being compelled to use decaying or spoiled or badly preserved or poor food, and third, monotony of diet with insufficient variety, so that the three great kinds of foodstuffs, meats, starch-sugars, and fats cannot be obtained in their proper proportions.

All of these the progress of civilization has wiped out, or is wiping out one after another, and our modern markets with their abundant supply of every imaginable variety of food, animal and vegetable, fish and flesh, fowl and "good red herring" the whole year round, the introduction of preserves and of canned goods, made possible by the discovery of sugar, and the permanent supply of fresh vegetables and salads and fresh fruits the whole year round, by improved methods of culture and rapid means of communication, together with the increase of wages which has placed all these blessings within the reach of the working class, — the backbone of the community, — have made the twentieth-century stomach the best in the world, and the twentieth-century man the tallest, strongest, longest-lived, and most efficient human machine that the sun has ever yet shone on.

Now, what is to be said as to those permanent, habitual, chronic disturbances of the digestion, known as dyspepsia? First and most important of all, that it is idle to look for the cause of them, nine times out of ten, in the stomach or even in the food. The only ways in which foods can cause chronic dyspepsia is by being chronically insufficient in quantity or poor in quality, or monotonous in kind. In fact, the best advice which

can be given in one sentence to the average dyspeptic is, eat plenty of every real food that you feel an appetite for, and watch the results.

If you are not relieved by this prescription, then you may feel reasonably certain, nine times out of ten, that the cause of your trouble lies outside of the realm of dietetics. If your dyspepsia tends to be of that unfortunate kind which has no appetite, then the thing for you to do is go and get one. And the place to get it is the place where appetites, like all other wholesome plants grow, out of doors.

By far the commonest and most potent cause of dyspepsia is lack of exercise in the open air, and the second commonest is lack of rest. Very few people over-eat, but a great, great many people, particularly business men, indoor workers, and women of the well-to-do classes, under-exercise. It is not too much fuel in the fire box that makes clinkers, but poor coal and the lack of proper draft. From four to eight miles of walking a day or its equivalent in the open air will cure ninety per cent of all cases of dyspepsia in men, and from three to five miles or its equivalent, in women.

Tonics, appetizers, and pepsins of all sorts are of the Evil One, for they, at best, simply trick you into swallowing, with an illusion of appetite and relish, food which your muscles are not prepared to burn up properly, for the real ultimate digestion of the food takes place in the muscles of the body. Muscle, not brain, is king of the body and sends its orders to the stomach in the form of appetite, to the lungs, for deeper breathing, to the heart for more rapid and more powerful beating,

and to the brain, to devise means for meeting those demands which result in what we are pleased to term thought.

The only way in which we can affect, through our own voluntary acts, our stomachs, our livers, our hearts, and our nervous systems, is through our voluntary muscles in the form of exercise. Pepsins and digestants of all sorts are peculiarly irrational and foolish, first because the stomach can make its own pepsin in abundance if it is properly fed and the whole body properly exercised; in other words, hunger is the best digestant as well as the best sauce, and second, because careful analyses of our gastric juice in all forms of dyspepsia have shown that whatever may be lacking, pepsin is always present in abundance. Acid is the thing needed. Furthermore, two thirds of our so-called dyspepsia and chronic difficulties with digestion have their seat not in the stomach, but in the intestine in which pepsin is about as effective and useful as snow in Timbuctoo.

The next great remedy for dyspepsia is rest, first after meals, second between meals, and third at night. The ten-minute lunch-counter lunch, and the twenty-two minute railway eating-station dinner, supposed to be typical of the American business man, are bad enough, but in view of the fact that they usually consist of a good variety of most nutritious, digestible, and well-selected food materials, a healthy stomach would be perfectly able to take care of them even if swallowed in chunks an inch square, if it were not for the equally hurried cyclonic rush back to the desk or

counter which follows them, thus giving the stomach no opportunity to call away from the brain and the muscles and the skin the supply of blood which it needs for starting its load on the way toward digestion and the manufacture of its gastric juice.

And in one sense, exercise in the open air comes under the same head, in so much as it means giving the most overworked and incessantly occupied parts of the body, the brains and our nervous system, a comparative rest during the time devoted to it. But nine hours of good sound sleep at night, with the windows wide open, would be a wonderful help to most cases of dyspepsia, and the fifteen or thirty minutes' nap after lunch and a break about the middle of the afternoon for four o'clock tea would also be found exceedingly helpful for both men and women. And as for children, particularly of the restless, nervous, and irrepressibly mischievous type, who have no appetite and would rather play than eat, we simply put them to bed and keep them there until their appetite comes back and they begin to lay on fat.

If neither abundance of good food nor exercise nor rest will relieve your dyspepsia, then the probability is that you have to deal with some special disturbance or defect either further down in the alimentary canal or entirely outside the digestive system.

One of the commonest causes, for instance, of chronic dyspepsia is eye strain, and persistent lack of appetite or discomfort after eating or gas on the stomach or so-called gastralgia will be completely relieved by the fitting of a proper pair of glasses and the taking off of that incessant strain on the nervous system.

Another common cause of chronic digestive disturbances is catarrh, so called, by which is meant some persistent infective or suppurative process going on in the nose or throat. Closely allied to, and indeed more common and potent than this, is bad teeth, which act both by making proper chewing and mastication of the food impossible and also like catarrh by pouring down the throat into the unfortunate stomach one incessant stream of pus and the germs of suppuration or putrefaction.

It is not too much to say that probably half of all cases of chronic dyspepsia are due to these three causes combined, — eye strain, bad teeth, and catarrhal conditions in the nose and throat. Go to a competent expert and have these conditions relieved and your dyspepsia will often disappear as if by magic.

Of late years, we are discovering another set of conditions which are surprisingly common causes of chronic dyspepsia, particularly in the utterly unmanageable, serious, and painful varieties. These are inflammatory or diseased conditions of other parts of the alimentary canal. One of the commonest of these is our centuries-old friend which we have so recently discovered, appendicitis. So frequently a factor is it that when we are confronted with a case of severe, persistent, and unmanageable dyspepsia, which has resisted treatment and for which we can discover none of the more obvious causes, we proceed to investigate most thoroughly the condition of the appendix. Even where there has been no marked open attack of appendicitis, a thickened, inflamed, adherent condition of

the appendix, with or without the presence of a stone or other fecal concretion, will be found, and when this has been relieved, the dyspepsia comes to an end. Next in frequency comes disturbance in another rudimentary "side show" of the food tube, the gall bladder. Many a chronic dyspeptic, especially if he has been subject to attacks of jaundice, will be promptly relieved by the opening and draining of an inflamed gall bladder or by the removal of a couple of dozen gallstones.

Still another cause of the more painful forms of dyspepsia, especially those attended by much vomiting or the passage of blood, is an ulcer either in the stomach, or almost equally frequently in the duodenum or other part of the intestine.

Last, but not least, those painful and quite common disturbances which affect the last and final segment of the alimentary canal, are also frequent causes of distress referred to the stomach, as apparent disturbances of the digestion. The method of action of these disturbances lower down in the canal in producing dyspepsia may be roughly stated as of the "block" order. Each one of the segments of the alimentary canal below the stomach has the power, so to speak, to send up orders to the stomach to hold up the food when conditions are such that its coming would cause or increase pain. Fissures, ulcers or hemorrhoids, by block messages of this description, frequently cause prolonged delay of the food in the stomach, followed by putrefaction and formation of gas, heart-burn, and all the other familiar cycle of disturbances.

CHAPTER V

CONSIDER THE LIVER

OF all the flowers born to blush unseen the liver is the most eminent. If it were only as conspicuous as the brain we should probably be just as proud of it. As it is it excels the brain in weight and is an even more desirable citizen and sturdier pillar of society. Yet we loftily ignore the liver's existence and never speak of it except when it is "out of order," though, as its mere size would suggest, it is one of the most important, most hardworked and overstrained as well as most delicately adjusted and exquisitely efficient structures in the body. It plays whatever tune it will upon the keyboard of the brain cortex, and colors the visions of the mind as a spotlight does the draperies of the ballet.

Yet most of us do not even know where this power behind the throne sits in darkness. We refer pains in the left side of it to the heart, in the middle of it to the stomach, and call the remainder of its disturbances pains in the chest or stitches in the side.

If we knew half as much chemistry as the liver has known these five million years past, the secrets of the universe would lie before us like an open book. Even to-day it is the most wonderful and resourceful chemical laboratory in the world. Nothing can equal it — even in Germany.

We think we have done wonders in discovering a poison that will kill or neutralize the toxins of a single germ — such as mercury, or the diphtheria antitoxin; but one little six-sided, sallow-looking lozenge of a liver cell — no larger than the head of a pin — not only can neutralize and destroy any one of forty different toxins and poisons that are brought to it by the blood but can split them up so ingeniously as actually to turn one part of them into sugar fuel, another into starch or fat, and another into harmless bile waste.

It is the most wonderful poison sponge and toxin filter that has ever been invented or discovered. And the moment it is put out of commission the body goes down in a heap — choked by its own breath, as it were; poisoned by its own wastestuffs. It is no wonder that the question "to be or not to be" — the problem of whether life be worth living — emphatically depends upon the metabolic integrity of our hepatic cytoplasm, to put it learnedly. When a man's "gall stops wukkin," as our African brethren picturesquely say, then nothing else much matters.

The liver has one, at least, of the characteristics of great genius. It has always been misunderstood and estimated at far below its real worth and dignity. For centuries after it was introduced to our attention by the delicacy of its flavor when eaten raw or broiled on a forked stick over a campfire, it was regarded simply as the *alter ego* of bacon and one of the autocrats of the primitive breakfast table. It was even held in such lowly esteem as to enter into the vernacular synonym for abject poverty — "three in a bed and liver for

breakfast." In the quaint phrase of the old saw, "Ef a man wuz born in a stable thet does n't make him a horse." The liver was born of and from the food tube; but, like Wesley, it has taken all the world for its parish, and a powerful preacher of righteousness and clean living it has been. When a man says he has a clear conscience he usually means that his liver is working well.

Until within recent years our knowledge of the liver was of the vaguest and most curious sort. Its first introduction to our official notice was at the hands of those quaint old mountebanks, the Roman augurs, or *haruspices*, who, in their temples and shrines, were accustomed to foretell the future and give advice in times of war and uncertainty by examining the internal organs of freshly killed animals — much as their doddering lineal descendants to-day tell fortunes by reading the lines of the palm or interpreting the grounds in a coffee-cup.

The liver was one of the augurs' highest trump cards in this kind of hocus-pocus, chiefly on account of its size and striking appearance, and also probably from the fact that it showed more changes which even their ignorant eyes could appreciate, as a result of the attack of different diseases or from the use of different kinds of foods, than almost any other readily discoverable organ in the body.

Nobody but an expert pathologist can make much out of the changes in the heart, even when it has been the site of fatal disease. The only readily obvious changes in the stomach are in its size, which even the

limited intelligence of the augurs soon led them to discover depended solely upon the amount of food it contained. And the lungs are merely more or less reddened and solidified "lights" to the general eye. The liver, however, which weighs three pounds and is the size of a Rugby football to begin with, may, if fatty or hypertrophic, swell up to six, seven, or eight pounds, and turn from dull purplish red to light golden brown in the process. In some diseases it may shrink down into a wrinkled and twisted three-quarter-pound slab of scar tissue no bigger than a slipper, when it is called atrophic — or, if knobby and sole-like, it is called "hob-nailed."

Such changes as these are fit to conjure with; they give the imagination something to work on and furnish an excellent groundwork for prophecy — far more than most prophecies have in fact.

When to these striking and dramatic changes, which the mass of the organ itself is capable of, are added additional variations and color contrasts furnished by the changes in size, color, shape, and thickness of the wall of the pear-shaped, dark green gall-bladder, contrasting so vividly with the liver's dull purplish-red background, one can readily see what a superb asset in their primitive flimflam games the old augurs had in the liver. In their little game it was not hearts that were trumps but livers.

Grotesque old harlequins and conjurers as they were, they were the harbingers and, indeed, the forefathers not only of religion but of medicine. Out of their vague and rambling conjectures grew up our whole theory of

psychology — the three faculties of the mind, for instance: the head, or intellect; the heart, or will; and the liver and bowels, or emotions. These, carried over into the realm of theology, produced such singular figures of speech as a "clean heart," "bowels of compassion," and so on.

All our psychology — and our philosophy up to thirty-five years ago — was based frankly and flatly upon the philosophy of these primitive vivisectionists.

On the borderland between mind and matter, between philosophy and physics, was built up the quaint old fairy tale of the four temperaments — the bilious, the sanguine, the lymphatic and the nervous. Each kind of temperament was supposed to be due to the dominance in the body of four corresponding fluids or "humors" — the bile, produced by the liver and stored in the gall-bladder, as any child could see for himself; the sanguine, produced in the heart and contained in and symbolized by the blood; the nervous, secreted by the brain and poured out all over the body through the nerve trunks; and the lymphatic, secreted by the lymph glands or "kernels," such as can be felt in the neck and armpits and groins, and symbolized by that milky, whitish fluid, the lymph. Thus a man's "humor" literally came to mean his mental state.

Even in scientific medicine we have scarcely yet shaken ourselves clear of the absurd obsession of the four temperaments, while in popular and psychological thinking it still holds full sway. In this quaint and picturesque game of colors and fluids and symbols the liver naturally took a high rank and played a pro-

minent part on account of its many qualifications for striking the eye and its wide range of variations in size, color, and texture.

Though we laugh at the augurs' methods of divining the future and of deciding what to do in case of doubt nowadays — except when we are very badly frightened or unusually silly, which happens even to the wisest of us once in a while — primitive practice has graven the liver deep into our language in such a way that it will never be effaced. We use the term "livery" or "bilious" quite as often to express that we are blue, and generally discouraged and out of sorts, as that we have a coated tongue or a burning stomach.

Almost half of the words we use in describing mental states, particularly of a depressed character, are drawn from the liver. For instance, we have not the remotest idea that we are borrowing anything from those quaint old medicine-men or augurs — if, indeed, we ever remember having heard of them before — when we say that we feel "melancholy"; but when we come to dissect the word we find that it simply means in Greek "black bile" — in other words, that we are under the influence of an unusually large amount of biliary secretion in our system.

To describe a more permanent mental depression we say that one of our friends has become a "hypochondriac"; and when that word is cut up it resolves itself into "under the cartilages," meaning the cartilages or gristly parts of the lower ribs under which the liver lies. When we describe ourselves as "nervous" the nerve fluid is supposed to be secreted in excess in

our systems and to be overstimulating us and making us "jumpy" and excitable.

So real a thing, for instance, was this nerve fluid believed to be that even as late as the middle of the fifteenth century great and distinguished surgeons, like Ambroise Paré, when amputating limbs, used to tie off not merely the arteries to prevent the escape of blood but the nerve trunks to prevent the escape of the nervous fluid, the loss of which, it was firmly believed, would cause the patient to bleed to death just as genuinely as if an artery had been left untied. How exquisitely this tying of the nerve trunks must have added to the comfort of the unfortunate patient can be well imagined.

Many of our proverbial differences of point of view are due to the particular poisons which, like the eagles at Prometheus', are gnawing at our liver. The old proverb, *Tot homines, quot sententiæ* — "So many men, so many opinions" — would be nearer the truth if it read: "So many livers, so many grouches." What a man knows is a matter of his brain, but what he believes depends on his liver.

As medicine and religion have a common ancestry, which is one of the reasons why they sometimes "scrap" so cordially when they get together — it is a family fuss, — these necromantic ideas about the liver were transferred bodily into primitive medicine. From the very earliest times there has been a singular tendency to associate all depressed and melancholic or apathetic states of both mind and body with a disordered condition of the liver. And the conjecture,

irrational as was its origin and grotesque as is its logic, was not far wide of the mark after all.

There is nearly always some rational basis, some kernel of truth, some shrewd guess underlying every popular impression or even superstition, grotesque as it may be in its details and absurd in the extremes to which it may be carried. The germ of truth underlying all the old melancholic conceptions of the liver was that, as we have just discovered upon definite experimental grounds within the last half-century, our mental as well as our bodily states are very largely dependent upon the poisoning of our nerves and our brains by toxins carried to them in the blood from a hundred different sources within and without the body. And as we have also discovered in the past couple of decades that the liver is the great toxin absorber and antitoxin generator for the entire body, no matter what may be the sources of the poison, it is clear that our views of existence, and whether it is worth while continuing it or not, must depend very largely upon the efficiency of our liver-filters.

Of course every one knows that the liver is a digestive organ, and that its main business is to secrete the bile. It does very much more than that, however, and the manufacture of bile is one of the least important of its functions. The stock of the bile has gone steadily below par ever since it was carefully investigated and accurately studied, and it is now regarded as chiefly an excretion or waste product, poured into the alimentary canal in order to be got rid of; though Nature, with her wonderful and irrepressible economy, has

contrived to utilize it on its way out for some trifling services and odd jobs, principally in the way of housecleaning.

Not only does all the blood from the walls of the active part of the food tube go directly to the liver through the great portal vein and its branches, thus carrying every particle of the dissolved food and any poisons that are contained in it directly to the liver, but also the largest millrace current of blood from the great trunkline artery of the body — the aorta — is received by the liver. This means, of course, not merely that almost every scrap of our food passes through the liver before any other tissue in the body can get even a smell of it but also that, owing to the size of the artery and the vigorous pumping of the heart, all our blood is driven through the liver-filter once in twenty minutes.

The liver, then, is a combination of quarantine station and filter — first for the food, and second for all sorts of poisons in the blood from all over the body. No organ in the body has been more maligned and none is more worthy of our highest gratitude and esteem. It has been accused from time immemorial of flooding the body with a dark green tide of its biliary secretion and producing not only that dark brown taste in the mouth but all the tortures of melancholia and biliousness, the "hip" and the "hump," out of sheer exuberance of spirit or pure cussedness. It really stands as a majestic sentinel at the main gate of the body-fortress, giving neither sleep to its eyes nor slumber to its eyelids day or night, testing with laboratory rigidity every drop of melted food before allow-

ing it to pass on to the muscle cells and the nerve cells, challenging every poison and toxin and arresting every invading bacillus or vagrant germ.

Then when, worn out with overwork or overwhelmed by a sudden flood of poisons too powerful for it to check, it allows some toxin-invader to slip by it and play havoc with the cells of our nervous system we say we are "bilious" — and blame the liver!

For many centuries, on account of its commanding position upon the great blood-stream that carries melted food from the alimentary canal to the heart, we supposed that the liver's chief if not only function was to deal with and bar out poisons contained in our food or resulting from its digestion and indigestion. Thus the principal causes of the liver's disturbances and diseases were supposed to be food and drink and the things that were mixed with them; but this has been found to be far too narrow a view. Indeed we are rapidly coming to the opinion that a large share if not a majority of the diseases of the liver have little or nothing to do, in their origin, with either food or drink.

We have also come to realize that many of the so-called digestive disturbances of the liver are caused, not by the food itself, either in its amount, quality, or combinations, but by the bacteria or other germs or parasites with which food is contaminated and which are introduced with it, just as we have seen is the case also with dyspepsia, indigestion, and the disorders of the alimentary canal in general.

The well-known "tropical" or "East Indian" liver, for instance, which is so common a cause of complaint

among retired merchants, traders, military officers and government officials who have served long terms in tropical climates, absurdly supposed to be due to the eating of too much meat, fats and other "heating" foods, is now known to be due almost solely to the attack of the disease germs and parasites that swarm in hot climates. Indeed probably two thirds if not three fourths of "tropical liver" is due to just two of these parasites — the plasmodium of malaria and the amœba of dysentery.

Scores of attempts have been made to produce enlargement, shrinking, fatty degeneration or other diseased conditions of the liver by feeding animals upon excessive amounts of different kinds of foods, especially such as are supposed to throw most work upon the liver. It has been found utterly impossible to produce anything more than the most temporary disturbances by means of food, even when administered with a stomach-pump and utterly alien to the natural tastes and requirements of the animal; but the moment disease germs were mixed with the food then it was perfectly possible to produce, almost at will, any liver condition that might be desired. Certain animals which were unusually vigorous and healthy proved the exception, as they were able to destroy and digest even large quantities of these germs without any apparent effect upon their livers.

Diseased conditions of the liver could also be produced by mixing small amounts of mineral poisons like lead and arsenic with the food; and one or two organic poisons like chloroform and alcohol were also found to

have special injurious effects upon the liver. It was found necessary, however, much to the surprise of the experimenters when endeavoring to produce the classic so-called alcoholic changes in the liver, to administer it in very large amounts— sufficient, in fact, by its direct irritating effect upon the stomach, to set up a catarrhal irritation and inflammation of the lining of the alimentary canal. Thus the relation between alcohol and diseases of the liver, including the famous hobnailed or drunkard's liver, is not so direct as we at one time supposed it to be.

In fact the action of the liver upon alcohol throws an interesting light upon its method of dealing with other poisons which, like alcohol, would be highly injurious to both nerve and muscle cells all over the body if they were permitted to get past the liver in their original form. The cells of the liver possess a remarkable and ingenious power of not merely stopping poisons as a filter might but of actually converting them into harmless substances which can be permitted to pass into the blood without injury to the body.

This it does by breaking down or, in chemical language, "splitting" their molecules; and that is probably why the liver has so little power of antagonizing or arresting simple metallic poisons like lead and arsenic — for their molecules are, in the first place, very small and simple; and, in the second place, when broken down or split up the fragments are still poisonous.

What makes the problem still more difficult and the intelligence of the liver cell even more superhuman—

for the whole is not always greater than its parts except in pure mathematics, and little, insignificant, gumdrop-looking cells in our body can do things with one hand tied behind them, so to speak, which we could not do to save our lives — is that not only may all poisons except mineral ones be split into perfectly harmless compounds but also, conversely, all foods, however harmless and nutritious, may be split into poisonous compounds — and this splitting actually takes place in the process of digestion.

For instance, two of the most dangerous of known poisons — the one on account of its deadliness and the other on account of its commonness — prussic acid and alcohol, are actually produced in the human body, not merely daily but hourly and every minute, in the process of digestion. The amount of prussic acid produced, of course, is very small indeed; but the amount of alcohol is considerable, for the latest studies indicate that nearly a quart of it is formed in the body every twenty-four hours. The prussic acid is so promptly converted into something harmless, and the alcohol burnt so swiftly as fuel in the muscle-engine into simple carbonic acid and water, that these poisons have no time to do any harm to the body tissues; but if the liver were not strictly "on the job," like Doctor Wiley, day and night, think of what might happen to the body from the accidental poisons from its foodstuffs!

If, therefore, you would avoid biliousness, first and foremost submit to the challenge of that matchless and incorruptible sentinel at the outer wicket of the gate of

the body-fortress — the nose — every piece of food that you eat, and refuse to take into your mouth anything that smells tainted or "fishy," or musty or flat, or disagreeable in any way, or to swallow it if it tastes unpleasant. This will result in barring out, not only those spoiled foods which nobody likes, but also those half-spoiled foodstuffs and drinks which most of us have carefully trained ourselves to like in defiance of our instincts — such as alcohol, tobacco, sauerkraut, Limburger, and "hot stuff" generally. Though we should lose something in amusement, we should lose nothing in nutrition and gain much in health by so doing.

Though bad foods and drinks will account for a considerable number of the milder and more short-lived attacks of biliousness and liver trouble they are very far from explaining the more permanent and lasting diseases of that organ. Indeed a conviction is steadily growing, as our study becomes more accurate and our experiences wider, that a large share if not the majority of chronic liver troubles are not due to food at all.

The liver occupies one of the most dangerous posts in the entire body, as it is the testing point, filter and garbage burner to which are brought not merely all the poisons that enter with the food, or are formed in the alimentary canal as a result of indigestion, but at least two thirds of all the poisons, living and dead, that get into the body from other sources. It is only in recent years that we began to discover the enormous and important part the liver plays in our bodily resistance to

the attacks of fevers, that is to say, of the germs of infectious diseases.

We have long known, of course, that in certain infectious diseases, especially those that were chronic or lasted for long periods of time, such as malaria, the liver became very much enlarged and would afterward be found to be in a highly diseased condition, even though the patient had survived the immediate attack of the infection for many years.

The same was true, of course, in the chronic dysentery of the tropics, in gout and in certain forms of prolonged poisoning by inorganic poisons like lead and phosphorus; but these facts did not make much impression on our minds, as we merely put them down to the fact that the liver suffered from prolonged saturation of the disease poisons just as any other organ or tissue in the body would.

A decade or so ago, however, our attention was called to the promptness with which the liver would be attacked by certain poisons in a rather dramatic and unexpected manner. This came only when we were investigating and endeavoring to find the cause of a number of sudden deaths after the taking of chloroform for prolonged surgical operations. Much to our surprise the most striking and uniform feature in most of these cases after death was fatty degeneration of the liver. We had previously supposed that changes of that sort took weeks if not months to produce, but this discovery set the pathologists to thinking and experimenting; and it was quickly found, first, that this sudden fatty degeneration could be readily

produced in animals by large single doses of chloroform and other poisons, and also, what was still more interesting, by infecting the animals with the germs of various contagious diseases.

That sent us back to the post-mortem room at once, to examine the livers of those who had died of such acute infections; and we were not long in discovering that the most profound and serious changes produced anywhere in the body of our patients, by even such diseases as pneumonia, typhoid fever, scarlet fever, childbed fever, surgical fever or blood poisoning, and diphtheria were often to be found in the liver. The reason why these changes had escaped us before was that they seldom made much change in either the size, or color, or appearance of the liver to the naked eye, and that it was necessary to make a microscopic examination of the liver-stuff in order to be sure of them.

This gave us a clew to a number of these cases — for instance, why jaundice should occur in fatal cases of a good many acute infections, such as typhoid fever, malaria, childbed fever, pneumonia, and peritonitis or blood poisoning. It explained why, in certain exceedingly fatal forms of pneumonia, such as the dreaded "miners' pneumonia" of our Western mining camps, the liver should be found after death as a blackened and broken-down mass, so destroyed and altered that it had attracted the attention of even the mining-camp doctors, and the disease had become popularly known as "Black Death of the liver."

In fact by piecing together all our information we came to the conclusion that the first place, so to speak,

to which the germs and poisons of infectious diseases — no matter where they might have entered the body — were hurried by the blood stream was the liver; that it bore the first brunt and the heaviest shock of their attack; that so long as it was able to neutralize the poisons and arrest or destroy the germs the infection did not "take" and the body, as a whole, escaped the attack of the disease — in short, that resistance to a given disease, and the question as to whether we succumbed to an infection and developed a full-grown attack or not, depended largely and fundamentally upon the liver.

Further, in cases where its first resistance had been overcome and the body had proceeded to develop a general attack of the disease, the extent to which the liver was able to neutralize the toxins produced by the germs all over the body would be the measure of the vigor with which we would resist the attack; and the question of recovery was largely a matter of whether the liver was able to rally its forces and gradually get the upper hand of the invaders, or whether it sank under their attack and finally relinquished the field to the enemy. Whatever our final disease, a large majority of us die by liver failure, followed quickly by heart poisoning. When the heart fails in the final exitus it is because its muscle cells have been fed with unneutralized poisons instead of food by the blood.

Most forms of overgrowth or enlargement of the liver are now believed to be due to a rapid multiplication of the liver cells under the attack of the poisons of some infectious disease.

Even in its fall the liver remains loyal to the body, for this enlargement or overgrowth, which was originally regarded as purely inflammatory, has now been discovered to be an actual increase of new and comparatively healthy liver tissue. In other words it is a genuine attempt at growth on the part of the liver in order to cope with the increased amount of poisons brought to it.

Probably a large share of these enlargements achieve their aim, conquer the poison, and again disappear without ever having attracted our attention at all; but a considerable number of them are not so fortunate, and the newly formed cells begin to break down and their places are taken by fibrous or scar tissue. This as it matures hardens and shrinks, crushing within its pythonlike grasp the remaining healthy liver cells; and in the course of months or years our overgrown liver is converted into a leathery, shrunken, scar-indented mass of fibrous tissue, with only a few islands of healthy liver cells scattered about.

Whenever these few islands get below the minimum neutralizing requirements of the body the patient dies; but if he lives long enough the process will go on until the shrinking has reduced the liver to a half or even a third of its normal size. So that whether a man dies of an enlarged or a shrunken liver depends chiefly upon the stage of the process at which his vitality gives way.

Even in the present stage of our knowledge it is probably not too much to say that if you have been fortunate enough to avoid certain of the great dis-

cases that have a special tendency to attack the liver, such as typhoid fever, malaria, dysentery, and pneumonia; or if you have made a good recovery and given yourself every reasonable chance by skillful treatment and rest to throw off their effects, you need have comparatively little fear of serious disease of your liver. As there is no earthly reason why these four great diseases, together with many others that play a lesser part in damaging the liver, should not be wiped out entirely — and their conquest is now only a question of time, intelligence, and money — it can be seen that the prospect for the liver is anything but discouraging.

As has already been intimated some permanent or chronic diseases of the liver are produced by the prolonged absorption of small amounts of inorganic poisons, such as lead, phosphorus, and arsenic, usually introduced into the bodies of workers in particular trades involving the handling of these poisons. Fortunately the public conscience has now become awakened on this subject and is insisting in no uncertain tones that no individual, however successful or able, shall be allowed to poison his fellow beings for his own profit; and that any industry which cannot be conducted without ruining the health and threatening the lives of its employees shall be put out of business.

Our motto in considering diseases of the liver today emphatically is "Look for the poison." We are not only finding the poisons with accuracy and dispatch but discovering that nine tenths of them are

preventable and may be avoided by the exercise of ordinary cleanliness and intelligence.

Considering the ancient source of our beliefs about the liver, it is small wonder that many of them have little more foundation than the alleged influence of the stages of the moon on the growth of potatoes.

A good illustration is afforded by those familiar blotches of brownish or yellowish color upon the face and neck, which are known the world over as "liver spots," *Leber Flecken*, and so on. These have nothing whatever to do with the liver, but are a curious alteration in the amount of coloring matter or pigment which is present in every skin, even the whitest. They are probably due to some disturbance of the nerve twig supplying the patch of skin affected, and usually appear in conditions in which there is extensive disturbance of the nervous system, such as certain chronic nervous diseases and the curious wasting and disorganization of the skin which occurs in old age. Their appearance need not give rise to any uneasiness, as they seldom become marked enough even to disfigure the complexion, they never give rise to any other than cosmetic trouble, and disappear when their cause is removed.

The only reason, in fact, why these spots were ever connected with the liver, even by name, was that, to the innocent and childlike eyes of our ancestors of the Middle Ages, these marks bore a slight resemblance in hue to the color of that one fairly common disturbance of the color of the skin which is caused by the liver, the well-known jaundice, or "the yellows." Even the

frequency of this disturbance has been enormously exaggerated, and our ideas of its causation began, like most of our hepatic beliefs, simply by our putting the cart before the horse.

Jaundice is not due, as popularly believed, to the liver working overtime and pouring more bile into the blood than the body can dispose of, but to either that form of body waste which colors and forms the bile being produced in greater quantities than the liver can handle, or the tube called the bile duct, through which the liver pours bile into the intestine, becoming blocked by gallstones or inflammatory swelling.

Among the garbage-burning and waste-purifying functions of the liver is the duty of taking care of and discharging from the body the remains of the red blood corpuscles which are broken down in the work of the body by millions and billions every day. It is the well-known red coloring matter — hemoglobin — of these corpuscles, which when broken down causes the yellowish or greenish color of the bile. Exactly the same change can be easily seen taking place in the classic "black eye," or the black and blue — more accurately black and green — discoloration of a severe bruise anywhere upon the body.

A blow that makes a black mark is simply one which has ruptured one or more tiny blood vessels and allowed the blood to escape into the tissues, where it quickly undergoes this greenish discoloration. What happens, then, in jaundice is that, to put it roughly, some poison or poisons in the system are breaking down the red

blood cells with greater rapidity than usual; so that the liver is unable to filter their coloring matter out of the blood rapidly enough and the whole body becomes dyed a yellowish green.

That is why diseases which directly attack the red cells of the blood, such as malaria, are so often accompanied by either jaundice or a yellowish discoloration of the skin. A striking illustration is shown in the dreaded yellow fever, in which, so to speak, all the blood in the body starts to melt and break down at once, leaking out on the surface of the skin to form the dreadful yellow mask, and through the thinner and more porous wall of the stomach to produce the fatal "black vomit." Any of the acute infections — even a common cold — may be followed by mild jaundice.

The other chief way in which jaundice is produced is by a blocking up of the bile ducts, so that the liver can no longer pour the bile which it has separated from the blood into the bowels to be got rid of. The commonest cause of this obstructive jaundice is, of course, the formation of gallstones or inflammatory processes in the gall-bladder; and it can be cured by opening the gall-bladder and either draining out the germs which are causing the inflammation or removing the gallstones which are obstructing the bile ducts.

As a matter of fact, however, jaundice is not one fourth so common as is popularly supposed, for the reason that, having once identified the liver and the bile with melancholic frames of mind and depressed conditions of the system, it was instantly concluded that any one whose complexion appeared sallow or yellow,

or of a greenish hue, was suffering from jaundice or an attack of "liver." What really happens is this, that all human skins, even the whitest, have considerable yellowish pigment in them — people of average complexion a good deal, and those of brunette complexion still more. In conditions of vigorous health this yellow tint is masked or neutralized by the abundant supply of red blood in the vessels of the skin; but when either the amount of blood in the skin is diminished by a weakening of the force of the heart beat or the color of the blood itself becomes less vivid from disease, then this natural yellow tint stands out in all its naked hideousness. That is why the majority of people, when they become pale or anæmic, become yellow or sallow at the same time.

This natural pigment or coloring matter in the skin has also given rise to an absurd old popular superstition that persons of brunette or dark complexion are more subject to liver trouble and more readily become bilious, the only basis for this belief being that when from any cause the rosy hue of health disappears from their skins their natural yellow or brownish color stands forth with vivid distinctness. They are not a particle more bilious than the palest and chalkiest-faced blonde. Those of us with more than a certain amount of pigment in our skins, popularly known as brunettes, turn yellow instead of white when we become pale.

Not infrequently the liver falls a victim to its own devotion from the fact that some of the numerous germs or parasites which are carried to it to be strained

out of the blood manage to find a foothold and grow in its own tissues — not very frequently, fortunately, for the liver is a tough and wary old fighter; but often enough to cause the death of the body later.

One of the commonest invaders to find a foothold in the liver in this way is the tubercle bacillus. Tuberculosis of the liver is a fairly common complication — next, indeed, after that of the lungs and the bowels. The human liver, however, resists tuberculosis very well, and its attack is seldom the cause of death; but in cattle and birds, particularly domestic poultry, the liver is one of the commonest sites of tuberculosis; and the most serious changes that take place anywhere in the body occur here. In birds, for instance, it is three or four times as frequently affected as the lungs are, just reversing the usual human proportion. It is well for wary housekeepers to do a little "liver-gazing" on their own account, and to insist on seeing and carefully examining the liver of every chicken and turkey they buy.

The commonest organic disease of the liver is abscess, which again is due to the setting up of inflammation or pus formation in the liver by various disease germs — most commonly those which cause dysentery or diarrhœal disturbances of the bowels, and are from that point carried to the liver. The well-known "tropical abscess" of the liver is largely due to the attack of the germs of dysentery, diarrhœa, or malaria.

Several of the animal parasites that infest the alimentary canal are also carried to the liver, and one group of them, the so-called hydatids, undergoes a

stage of development there, producing large cysts or bladderlike growths filled with fluid and with the larvæ of the parasite. One of this group of parasites is exceedingly serious and fatal in both cattle and sheep — the famous, or rather infamous, liver fluke.

The liver also, like every other organ consisting of epithelium or secreting stuff, is subject to the attack of cancer, and in rather a high degree, being about the fourth most common site of cancer in men, only the lips, tongue, stomach and bowels ranking ahead of it — and the sixth most frequent in women. Even this, however, serious as it is, is far from the hopeless death sentence that it was fifteen or twenty years ago. Modern surgery, with its perfected methods, does not hesitate boldly to attack and remove cancer or any other growth from the very substance of the liver itself, and — if its presence can be detected early enough — with fair success.

CHAPTER VI

CATARRH, OUR NATIONAL NASAL LUXURY

HOW far do our defects make up our personality? Certainly it is our departure from the normal, from the dead level of the mass, that distinguishes, that makes our individuality. And these departures are almost as often downward as upward, defects as virtues. Rid us of all our faults and our peculiarities of temper, and our friends would have great difficulty in recognizing us in Heaven. Even national traits, characteristics that are supposed to distinguish peoples and to mark them off from the rest of the race, may be defects, or based upon defects.

The two characteristics that are unanimously agreed upon by visitors to our shores as distinguishing the typical American are his high-pitched, nasal speech and his lank and angular habit of body. The first of these is frankly ascribed to the universal prevalence of catarrh, and the second to the American habit of bolting food and of promiscuous expectoration.

In fact, I believe that, to the average European mind of even the intelligent class, an American without a catarrh or a dyspepsia would be as unthinkable as an Irishman without a brogue. That this popular impression is considerably less than a half-truth is certain, but what precise percentage of truth may

underlie it is impossible of accurate determination, for the reason that no data or statistics as to the actual prevalence of either catarrh or dyspepsia exist on either side of the Atlantic, neither of these diseases being fatal. Catarrh of all sorts is exceedingly common in both hemispheres, and any one who has had experience in nose and throat clinics in New York, in London, in Berlin or Vienna, would find it very difficult to state on which side of the Atlantic it is more prevalent.

One thing that much confuses the matter is that in Europe in general, and in England in particular, disturbances of nose and throat are very seldom referred to as "catarrh." I have heard intelligent Englishmen, who were perpetually snuffling and hawking, indignantly repudiate the suggestion that they had catarrh — "that disgusting American disease!" They had only a little stuffiness in the head, a chronic bad cold, and "everybody runs at the nose a little in the winter months!" As the American stands aghast at the laconic frankness with which the average Englishman or Englishwoman will, in ordinary conversation, refer to the different sections of his or her anatomy, so the Englishman is shocked by the frankness, and even cheerfulness, with which an American will admit that he has catarrh or dyspepsia and proceed to discuss delightedly his symptoms in public. At least two thirds of the supposed difference in the prevalence of catarrh in England and America is due to the fact that the American talks about it and the Englishman does n't.

Therefore, we may rid our minds of the uncomfortable beliefs that catarrh is a peculiarly American dis-

ease, a new disease, or an increasing disease. These impressions may be correct, but we have absolutely no trustworthy data upon which to base them, and all the presumptions and probabilities of the cause run strongly in the opposite direction.

Inasmuch as catarrh is chiefly due to repeated infections, to foul, overheated air, to lack of cleanliness and proper care of the nose and throat in childhood and to unsanitary conditions generally, the probability is that it is steadily diminishing in frequency and in severity, as all these conditions are being improved or wiped out. Certain it is that the more repulsive and distressing forms and results of the disease are rapidly becoming rarer as a result of increasing intelligence and the quickening of the hygienic conscience.

Whether the high pitch and nasal twang of American speech are due to catarrh is an open question. Certainly other nations and localities have catarrh without having their voices made nasal thereby; indeed the affliction seems rather to make the voice more guttural and husky.

What is catarrh and why does it attack the nose? Few things are more difficult to make than precise definitions. They are impossible, in fact, in any but the exact sciences, and medicine is not yet one of these — it has too much human nature in it. Catarrh is an exceedingly vague and general term; oddly enough, even more so in medicine than in popular usage. In medicine catarrh is the name of a symptom, without any reference whatever to its cause. Roughly speaking, any disturbed condition of a surface attended by

an unusual amount of discharge, or flowing, is called catarrh. Thus, the catarrh of popular speech is known as nasal catarrh; attacks of stomach disturbance attended by the pouring out of mucus are known as gastric catarrh or catarrhal gastritis; and we may have catarrhal disturbances of the liver, the intestines, the appendix, and practically any region of the body that is lined by mucous membrane. In the olden days we used often to speak of inflammations of the skin attended by much weeping or flowing, such as eczema, as catarrh of the skin. This is in accordance with the meaning of the word catarrh, which is derived from two familiar Greek words, *kata*, down, and *rheo*, to run or flow — literally, a "pouring down" or discharge.

Even nasal catarrh is very far from being a single, individual, definite disease. Strictly speaking, there is no such disease, as the name is based solely upon results and means only a chronic irritation of the nose and throat, usually accompanied by more or less discharge, thickening and obstruction, which may be due to forty different causes. It is, in fact, as vague a term as headache, or lameness, or general debility. We are not even sure whether it is due chiefly to external or internal causes — to dust, gases, microbes, or other irritating features breathed in through the nostrils, or to peculiarities and lack of vigor and resisting power in either the nose in particular or the system in general. Probably in most cases we have a combination of both these factors. Few permanent cures of catarrh are ever effected by treating the nose alone.

To put it briefly, there are three main factors in the

production of that delightful complex of choke and snuffle and hawk that we call catarrh. These are, first, the irritating features of the air inhaled, such as cold, dryness, dust, gases, and germs; second, the shape and size of the nose and nasal passages; and third, the general vigor or weakness of the entire system, and the corresponding poorness or richness of the blood. At least two of these conditions must be present for catarrh to develop. The most infectious of germs, the most irritating gases, the rawest of air will fail to develop more than a mere temporary inflammation or irritation, which is quickly thrown off by vigorous, healthy individuals, who take plenty of exercise in the open air, plenty of cool baths, and who sleep with their windows open. On the other hand, it is extremely doubtful whether even the feeblest and flabbiest of individuals, not actually diseased, would ever develop a catarrhal condition of the nose or throat so long as germs and dust were entirely excluded from the air that they breathe. And the worst and most obstinate cases of catarrh are usually found in individuals who have the third factor present — some blocking or deformity of the nasal passages.

Contrary to popular impression, neither climate nor occupation plays any important part in the production of the disease. It is of nearly equal frequency and severity all over this American continent, from the Arctic cold of the Hudson Bay to the tropical heat of Florida and Louisiana, and from the raw moisture of the New England coast and the New Jersey marshes to the Sahara-like dryness of Arizona. That the dry,

sunlit regions of the great Southwest are exempt from catarrh is little more than popular illusion based upon ignorance. Many patients going there from raw, cold, changeable Northern and Eastern states improve for a time, but are apt to relapse or to develop the trouble in some other form; while not a few individuals who go there without catarrh at all develop it from the dust and the stinging, cracking dryness of the desert air.

Man was born under water, grew up in the marshes, and became an amphibian and later a land animal at a comparatively recent stage of his career. Moisture is as indispensable to his existence and welfare as sunlight, and a too dry air and climate are even more unwholesome than a too damp climate. Indeed, as we shall see, the most elaborate and unstable part of his nasal mechanism is that which is devised for the purpose of moistening the air that he breathes, and dry, hot, foul air is responsible for far more catarrh than moist, cold air, however raw.

Almost the only influence exerted by climate and occupation in the production of catarrh is the indirect one of the amount of confinement in unventilated, ill-lighted rooms, filled with air that is foul whether from emanations from human skins, breaths, and teeth, or from the irritating chemicals, gases, and dusts of some industry or occupation.

There are regular and recognized forms, for instance, of occupation catarrhs — diseased conditions of the lining membrane of the nose due to incessant and perpetual irritation by dust or gases floating in the air. Thus we have fur-workers' catarrh, from the perpetual

tickling and irritation caused by tiny particles of broken hair and fluff breathed into the nose; carpet-makers' catarrh, from constantly breathing air thick with lint and, where shoddy is used, loaded with disease germs and all kinds of filth as well; printers' catarrh, from inhaling the clouds of carbon dust due to the dried printers' ink that is rubbed and shaken off the type as it is handled; match-makers' catarrh, from the fumes of sulphur and phosphorus; and a dozen others. Most of these occupations have, also, a very high death rate from consumption — due, of course, to the germs that float about and are inhaled with the dust in the crowded, ill-ventilated rooms in which the work is done. These appear either to be inhaled directly into the lungs through the mouth, on account of the obstructed condition of the nose, or else to be enabled to penetrate into the blood by means of cracks and ulcers and other weak spots in the chronically inflamed and irritated mucous membrane of the nose.

This brings us to the most important single fact in the whole problem of catarrh — namely, that the much-abused and much-enduring nose is not running and stuffing up out of pure incompetence or natural cussedness, but as a vicarious atonement for the rest of the body. What it suffers it suffers in a noble attempt to protect the rest of the body. The nose is both sentinel and scapegoat in one — one of the real unsung heroes of the body state — and all that it gets in the way of reward for the matchless devotion and splendid courage of its unfaltering attack upon every enemy that comes on the wings of the air is catarrh and con-

tumely. We are quite prepared to accept the warning of Proverbs to "Keep thy heart with all diligence; for out of it are the issues of life"; but we are forgetful of the twin hygienic commandment that should run: "Keep thy nose with diligence, for into it are the issues of death." Most of us forget that we have such a thing as a nose except when it blocks up or begins to run or makes us disagreeably aware of cooking or of the passage of the modern Juggernaut, the automobile.

Whether we ever were water animals, marine organisms, or not, the solid, unquestionable and immensely practical fact remains that all our body cells still are such, and can live and work and reproduce only when kept swimming in and saturated with water — and salt water at that! Every life process must take place in the wet, under water; and dryness is death, or suspended animation. We are literally walking aquariums, except for a fraction of a per cent of the cells upon the surface of our skin and in our hair and nails, and most of them are from one half to three fourths dead before they even begin to be dry.

Evidently, then, the only way in which air can be safely drawn into the moist, warm, living interior of the body is by arranging for its warming, moistening, and purifying as near the point of entry as possible. This is precisely what the nose undertakes to do, and is the fundamental why and wherefore of catarrh. How wonderfully successful it is in its attempt may be seen from the fact that air drawn into the nostrils at, say, forty degrees is in the incredibly short distance of about three inches raised nearly fifty degrees, satur-

ated with moisture and purified of nine tenths of its dust and germs. A curved thermometer passed in through the mouth so as to reach up into the back of the throat behind the soft palate shows that every breath of air drawn at an outside temperature of fifty degrees has been raised to eighty-five degrees by the time it reaches the pharynx. Also, it has been moistened and purified in proportion.

Do you wonder that the warming, moistening, and purifying apparatus of our poor noses sometimes breaks down under the strain of this miracle? How does the nose accomplish this warming and purifying process? On the familiar principle of the warm coil or the steam radiator. Instead of remaining a straight, smooth-walled, double passage it thrusts out from each of its walls three great elastic cushions, one above the other, called the turbinated — "scroll-like" — bodies, composed chiefly of coils of blood-vessels supported by a thin skeleton of bone and covered with soft mucous membrane.

On account of the elasticity of the meshes of blood-vessels in them, these bodies are capable of being puffed out like great air cushions, so as, in an emergency, almost completely to close the nostrils, thus rendering it difficult to draw air through them. We all experience this protective, balloon-like action in the promptness with which our nose blocks up when we step from a warm room into a temperature of ten degrees below zero on a winter morning.

The method of the nose for straining dust out of the air is simple in principle, though elaborate in applica-

tion. It is the familiar fly-paper, or sticky surface, covered in this case with a mucus tenacious enough promptly to tangle and stop all articles floating in the air, whether dust, lint, or germs. Chronic nasal catarrh, or catarrh proper, is, in the majority of instances, due to the "hang-over" or after-result of acute catarrhs or colds. In fact, a chronic catarrh might be defined as a permanent or at least very lasting, half-cured acute catarrh or cold. The big cushion valves — turbinated bodies — remain about half distended. The soft, delicate mucous membrane is swollen and sodden and spongy. The cushion-valves can neither expand to shut out sudden rushes of cold or dirty air nor contract so as to allow the free inflow of pure, clean air. Such dust and germs as are caught upon the mucous fly-traps, instead of being washed down and swallowed, stick and accumulate until they produce a raw spot on the surface of the membrane that cracks and deepens to an ulcer. These ulcers, by perpetual succession of irritations, get deeper and deeper until they eat even into the cartilages of the nose itself.

The secondary effects are almost as injurious. The victim, unable to breathe comfortably through his nose, draws in air through his mouth. This rushes directly back almost unwarmed, unmoistened, or unpurified, or very imperfectly so, to the back of the throat or pharynx, and into the voice organ or larynx. Here, combined with the sticky, half-putrid, pus-containing discharge from the back of the nostrils, it sets up an irritation in the pharynx, and a chronic sore throat results, which process is very likely later to

extend to the larynx, producing hoarseness and discomfort in using the voice. It cannot be too clearly borne in mind that two thirds of the diseases of the voice and vocal organs are due and secondary to diseases of the nose!

Meanwhile, the irritation and inflammation in the pharynx has been spreading in another direction, upward and outward. It soon reaches the mouths of the Eustachian tubes, those little remnants of the first gill-slits which run from the back of the throat or pharynx up to the drum cavity of the ear. The inflammation closes the mouth of the tube so that bubbles of air can no longer be sent from the throat to keep the drum properly inflated. The air of the drum cavity is absorbed into the blood, making a partial vacuum behind the drum. The pressure of the atmospheric air on the outer side of the drum promptly pushes it in, and we have the first stage of that sinking in and thickening of the drum membrane which is the cause of two thirds of our deafness.

Later the inflammation spreads right up the Eustachian tube from the throat into the ear, and we get an attack of earache with, perhaps, rupture of the drum or, more probably, permanent thickening and dulling of the hearing. Three fourths to nine tenths of all diseases of the ear and disturbances of hearing reach it from the nose and throat. The only safe and sure time to cure either ear trouble or laryngeal trouble, in nine cases out of ten, is while it is in the nose! If these diseases are treated in their nasal stage nine tenths of them can be cured. If they are left until they

have reached the ear seven tenths of them cannot be cured.

Now, what is to be done to prevent the lion's share of catarrh and catarrhal trouble due to germs? Warfare against such myriads of tiny enemies, that dance about us everywhere like motes in a sunbeam, looks almost hopeless. Fortunately, however, it is far from being so. While we do not know the names of most of these catarrh criminals and have not even their pictures in our pathological rogues' gallery, yet we do know something of their habitat and the company they keep, which is exceedingly useful for practical purposes. Unfortunately, their favorite company — with apologies to Lindley Murray — is us, but, luckily, us only under certain conditions and surroundings. Not one of them, for instance, is found anywhere in the fresh, open air of the country or in the air of reasonably clean and decent areas of the city. All of them, without exception, are to be found in the stuffy, mousy, unventilated air of rooms, halls, churches, and theatres which has not been changed for half a century. Keep out in the open air as much as you can; work, whether standing or sitting, in a gentle current of air, and sleep with the windows open — if possible, in a breeze — and you will avoid two thirds of your risks of colds and catarrh.

The testimony as to the impossibility of catching cold in the open becomes more overwhelming and unanimous every day. It is only necessary to note the last addition to it — that of both the claimants to Polar honors. Neither Peary nor Cook, nor any one

of their parties — starting, of course, as picked, vigorous men free from disease, dirt, and germs — had a trace of a cold, bronchitis, pneumonia, or catarrh during the whole of the sojourn in the Arctic regions, though often under the most trying conditions as to cold, wet, and exposure. The moment, however, that they reached civilization on their return — Cook in Greenland and Peary at Sydney — from one third to one half of their parties took furious colds and sneezed and snuffled and wept to celebrate their return to warm houses and foul air.

Against this cause of catarrh there is only one protection, and that is the gods of the fields and the woods, the west wind and the sunshine. Spend as much of your time as possible out-of-doors — and that ought always to be two thirds of it in childhood — and resolutely bring the outdoors indoors at every hour of your working and sleeping day. At the same time insist upon the most rigorous and scrupulous cleanliness of clothing, hands, and person; of floors, carpets, walls, and hangings — anywhere, in fact, where dust or dirt can lodge, and germs can and do lodge. The more spotlessly clean and flooded with sunlight any house and its occupants can be kept the more nearly germ-free they will be. One reason why there are so few germs of harmful character out-of-doors is that they cannot live and thrive in sunshine and fresh air. It is only the houses that we build that are their hatcheries — literally, greenhouses for germs.

But germs are not the only things that are required to produce catarrh. On the one hand, some people

would have trouble with their noses if there never was such a thing as a germ in the air; and on the other, thoroughly healthy, clean, wholesome individuals can with their nasal sieves strain out nine tenths of the germs that float in the air, choke them in their nasal mucus, and sweep them down the gullet to where the stomach will literally eat them alive. A certain amount of lowering of tone, of vigor and of vital resistance is necessary to allow the germs to get a foothold, particularly a permanent one, and it plays an important part in catarrh. This lowering of the vital tone is not solely in the nose, although the nose, for various reasons, is peculiarly susceptible, but is a general or constitutional condition that affects the nose as it does every other part of the body. In one sense it is quite true that, in popular language, catarrh is "in the system." Most fortunately, however, this fact, instead of complicating matters, simplifies them, for this lowering of resisting power, this slackening of vital tone in the nose, is chiefly and most commonly due to underventilation, overconfinement in hot, stuffy rooms, lack of vigorous exercise in the open air, underfeeding — in fact, to the very conditions that promote and increase the presence and infectiousness of germs.

There is yet another way in which systemic or other conditions are believed to produce and promote catarrh. We are all familiar with the promptitude with which, on exposure to cold, not merely our faces and hands, but the skin of our entire body surface, becomes first pale, then cold and, finally, almost wrinkled and goosefleshed. This means that the great skin mesh of

blood-vessels is emptying itself of its blood so as to preserve the warmth of the body.

Unfortunately, at the same time that the skin is emptied of its blood and this blood is thrown into the internal organs, the purifying or excretory action that the skin was exercising upon it is stopped also. And this action, relatively slight, but appreciable and important, has to be assumed by some of the internal surfaces of the body: lungs, nose, throat, liver, or food tube.

If these happen to be perfectly healthy they can take up the additional burden of purification without difficulty; but if any one of them happens to be already a little overtaxed, or fighting against some irritant, such as dust, food-poisons, or germs, then this little overload is the proverbial last straw that breaks the camel's back, and we get a catarrh, a bronchitis, an attack of indigestion or even of jaundice. The strong probability is that to turn this into a real inflammation of any sort requires the assistance of a germ; but there can be little doubt that the extra duties thrown upon the air passages and the food tube, our so-called "internal skin," encourage attacks of cold and catarrh — and this is the enemy against which the cold bath or splash is so useful. It makes little difference how cold water is applied, whether by splash, sponge, shower, or tub; the one thing needful is that the skin shall be given a sharp chill — enough to make you gasp slightly for a moment, as well as to make you acquire the habit of reacting promptly and of becoming, instead of colder, warmer than you were before.

It is not even necessary that the cold should be applied in the form of water. Exposure of the body to cold, fresh air in one's room, accompanied by vigorous rubbing, will do almost as much good as the tub or the shower. The main thing is to get the skin, not merely of the face, hands, and arms, but of the entire body, so trained that it will react promptly to cold by becoming fuller of blood instead of emptier, and not "lie down on" the lungs and stomach, at least until the latter have had time to adjust themselves to the new load. The advantage of water over air in this performance is, of course, that it is cleansing as well as stimulating. It is not too much to say that a cool or cold splash-bath down to the waist every morning — and an all-over splash or tub is better yet — will do more to break up the cold habit and the catarrh tendency than almost any other single thing except sleeping with the windows wide open and living out-of-doors.

The third factor, though fortunately not usually present, is very apt to be so in the most troublesome and obstinate forms of catarrh, and consists of defects or deformities of the nose. Some of these defects are the result of repeated attacks of the disease itself, such, for instance, as the now well-known *polypi*. These *polypi* are curious, spongy, gelatinous growths, in shape not unlike a lima bean and in size varying from this to that of a Blue-Point oyster, which in consistency and color they not distantly resemble. They are due to a watery, bulbous swelling of some part of the mucous membrane of the nose from repeated attacks of catarrhal inflammation or the constant irritation of pus and

other discharges. As these oyster-like growths have few nerves and fewer blood-vessels, nothing can be done to them in the way of making them clear themselves up or shrink; and the best thing is to remove them with specially-constructed forceps or wire snare — a perfectly safe and comparatively simple operation which usually gives great relief. It must, however, not be forgotten that they almost invariably result from a chronic, unhealthy condition of the mucous membrane of the nose and, if this condition be not corrected and kept so, other *polypi* will form and take the places of those that have been removed.

Another very common condition is a hypertrophic or overgrown state of the turbinated bodies, the great, triple cushion-valves that bar out cold and dust. These by successive swellings and irritations have become so firmly thickened that it is practically impossible to get them to shrink to their normal size without puncturing them with an electric cautery or cutting away small portions of them. Every possible means, such as antiseptic washes, massage and local treatment, are used to restore to them their natural elasticity and get them shrunk down sufficiently to admit air for breathing purposes, without depriving them of their power of swelling up so as to exclude largely dangerously cold or foul air.

Ninety per cent of ordinary catarrh, while annoying, obstinate, and humiliating, is, fortunately, a relatively mild and harmless condition which may last for years and decades and never do its victim any serious or vital harm unless it should happen to extend up his Eusta-

chian tubes to his ears or downward to his larynx. One particular kind of catarrh, in which adenoids, or spongy growths, are found in the pharynx back of the nostrils, is far the commonest cause of deafness and of ear trouble of all sorts in childhood; while chronic, neglected catarrh of the nose is the foundation and starting-point of at least three fourths of the deafness of adult and later life.

Another common cause of nasal obstruction and consequent catarrh is that known as deflections or bulgings of the septum. This septum, or partition, is a plate of cartilage, or gristle, combined with bone, which lies between the two nostrils, separating one from the other. This, normally, should be perfectly straight and flat, but actually, for some reason which we do not yet clearly understand, in a good many noses will be found bulged to one side or the other. Such bulging, of course, narrows the air passage on one side and expands and enlarges it on the other. These bulgings may become so abrupt and so extreme as to form folds or wrinkles, obviously interfering with the passage of air into the nose on the side toward which they project.

Whatever the cause, the only practical remedy is to cut away, under cocaine or ether, the superfluous and projecting folds and portions of the septum, flatten or splint the remainder of it back into position, and restore proper shape and capacity to both nostrils. A variety of operations have been devised for this purpose, most of which give great relief.

Another side-issue of catarrh which is worthy of mention is its extension, in the same manner in which

it attacks the nose and throat, to those curious air-spaces in the bones of the head known as the accessory sinuses. These are strange and somewhat unaccountable air-bubbles, or hollows, in the bones of the face and head, without known function except to expand the bony framework of the face so as to enable it to protect the eyes. The two largest lie on either side of the nose, between the orbits above and the teeth below, their outer walls supporting the cheekbones. Another pair — the frontal sinuses — balloon out into the forehead just above the eyes; and a series of others — ethmoid sinuses — sprout back on either side and from the roof of the nasal passages toward the base of the skull. They have no known function, but they are lined with mucous membrane and are filled with air which reaches them through narrow openings from different parts of the nasal passages.

Obviously, they furnish ideal disease-traps, for a comparatively small amount of swelling of the mucous membrane of the nose will block the narrow and irregular openings through which they empty into it, and if once a germ or some of its products forces its way into them they make model breeding-chambers, with almost no possibility of escape for the mucus or pus.

Naturally, little that is definite or of any wide application can be said in regard to the cure and treatment of a disease like catarrh, which depends upon the coöperation of so many scores — yes, hundreds — of different influences and causes, both external and internal. One thing, however, may be frankly said to relieve the pessimism in many minds as to the incurability of

catarrh, and that is that at least ninety per cent of it is curable under competent individualized treatment and attention. Perhaps it would be more nearly correct to say that nine tenths of the sufferers rather than nine tenths of the disease can be cured. Innumerable as are its causes, catarrh's victims all belong to one species of animals, *homo sapiens*, and the general line of procedure to which we have referred — that of cleansing the air and the surroundings generally and so increasing the vigor of the patient — will prevent nine tenths of all catarrh and either cure or markedly relieve eight tenths of all existing cases. For prevention and permanence of cure, general treatment by fresh air, cold bathing, food, and exercise is much more important and reliable than are local measures.

Where local damage has already been done this must be corrected by intelligent nasal treatment, at the same time that the patient is being trained in good habits of life; so that, when the old indebtedness is wiped out, he will not pile up a new one. Mildly antiseptic and alkaline washes and sprays, particularly those that most closely resemble the serum, or watery part, of the blood in their density, and which mechanically flush out and cleanse the nose until it is in a position to flush and cleanse itself, are the most useful local remedies.

Then come stimulating powders or applications, particularly such as are mildly antiseptic and do not injure or attack the delicate mucous membrane, but are just strong enough to produce a profuse flow of mucus and thus empty out the congested and swollen mucous

membrane and turbinated bodies. The use of these, however, requires great skill and judgment, for they should be just irritating enough and used just often enough to make the nose flush itself out, without setting up an irritation on their own account; as nearly all of them do if used indiscriminately or put into the patient's own hands. Direct massage of the turbinated bodies by means of absorbent cotton on the tip of a probe is also most useful. Also, such portions of the mucous membrane or the valve cushions of the turbinated bodies as have become hopelessly diseased should be actively treated or removed; bulges and spurs upon the septum corrected or cut away; sinuses that are full of pus opened, washed out, and drained. When these defects have been corrected, and the patient has been taught to be as "finicky" about the cleanliness of his air as he is about that of his food, ninety per cent of all cases of catarrh, however obstinate, can either be cured or made compatible with fair health, comfort, and efficiency.

CHAPTER VII

ASTHMA AND HAY FEVER

SOME men are born asthmatic; some achieve asthma; some have it thrust upon them! While all asthmatics are mentally in the last class, a majority are physically in the first. Asthma and hay fever both are vivid illustrations of that unfortunate class of ills to which the flesh is heir, in which it is the patient that makes the disease. There is, of course, the external match which fires the mine; but to cure the disease it is not enough to remove this external cause, you must remodel the victim if you can!

Perhaps this sounds rather discouraging for a beginning; but, like every cloud, it has a silver lining, or at least a silver-plated one. Even though — just as Boston is not a place, but a state of mind — asthma is not a disease, but a state of body, the fact has certain redeeming features. If you were born asthmatic you stand a good chance of dying asthmatic, but you are pretty safe to live fifty or maybe seventy-five years in between. You may sneeze your very soul out, and gasp until you think every breath will be your last; but it will very, very seldom kill you, though there may be times when you wish it would.

Further, and most consoling, even bodily make-ups can be remolded and remodeled by persistent and

intelligent pressure to an astonishing extent nowadays. If the explosive tendency in lung or nose be one of your bodily traits it has to take its chances with your other characteristics in the internal struggle for existence, and it may prove feebler and shorter-lived than any of them. In fact, this broad consolation can usually be offered to a large majority of hay-fever sufferers and a considerable share of asthmatics. Every year after the age of forty tends to weaken the grip of the disease, and those who have sneezed regularly every year in their youth or gasped every day for months at intervals through their young adult life will, in middle or later life, escape from their bondage with little more than an annual "rose cold," dust-sneezing, or an occasional wheezy cold or stuffy bronchitis.

The general belief that all diseases tend to become worse with advancing years, and that our resistance to attack and powers of recovery grow less and less with each reach of the river of time down which we drift, is fortunately far from true in a great many instances. It is one of the many compensations of maturer years that with those years we actually acquire an immunity from scores of disease attacks and disturbances to which we fell an easy victim in early life. We become seasoned veterans in life's campaign. The latter part of middle age and even old age itself, though periods of narrower scope of bodily activities, are often freer from pain and actual discomfort than the oft-apostrophized "happy days of childhood," with their pains and colics and cut fingers, both literal and metaphoric. This is the physical basis of Wordsworth's "years that bring

the philosophic mind." We don't react so violently, not to say explosively, to our environment. We are more comfortable if less ecstatic. We have shed our passions and acquired in their stead reasonable likes and respectable prejudices; less exciting, but far more comfortable to live in the same house with. We can take longer and hence more cheerful views of the universe. Particularly is this true of those disturbances and discomforts due chiefly to a peculiar sensitiveness or susceptibility of our nervous systems, which are grouped together under the name "neurotic." Their victims appear to have their nerves on the outside of their skins, as it were, instead of underneath. They literally "wear their hearts upon their sleeves for daws to peck at."

And every peck produces an explosion. Some of these susceptibilities are, of course, the indications and starting points of serious nervous or mental disturbance, but many of them are little more than a "thin-skinnedness" — an excessive tenderness and softness of both bodily and mental cuticle which make every rasp against its environment an agony. In such cases — and they are in a great majority — the cuticle toughens naturally and healthfully with advancing years, and many a man or woman who suffered tortures in childhood and young adult life from sick-headaches, neuralgias, nervous dyspepsias, palpitations of the heart, insomnias, fits of depression and discouragement, premonitions that they are not long for this world, will gradually grow calluses over his nerve-tips, strike a condition of balance, attain a con-

dition of health and comfort in middle life, and live to a good old age.

Asthma and hay fever both belong to this neurotic or "touchiness" group. Their body gasoline, as it were, has been turned out with too low a flash-point, so that a trifling rise of temperature will ignite it and cause an explosion in nose or lungs. The asthmatic and the "hay-feverite" are born — not made — that 's why they last so long! But as a compensation the hay-feverite enjoys a complete respite from his disease and usually excellent health from ten to eleven months out of the year. Ultimately, in nine cases out of ten, he outlives his disease completely.

The asthmatic seldom suffers more than from one tenth to one fifth of his time, is seldom prevented from conducting his affairs with efficiency, is practically safe to keep on living and wheezing for from thirty to fifty years, and has at least a two-to-one chance of outliving his disorder, which is literally, in more senses than one, a short-winded disease.

What we *don't* know about asthma would fill volumes, yes, whole libraries! But out of the welter and the whirl certain outlines are slowly rising, vague and somewhat indefinite as yet, but fairly reliable as a basis for future knowledge. While, as in the case of asthma, we do not yet know the cause of the disease and hence can do little radically to cure it, we do know a good deal about its history and its responses to certain influences, so that we can do much to modify and relieve it. We can very frequently cure asthma in the sense of stopping the attack and preventing its return for

months and even years, and each time we are able to do this after forty years of age there is a better chance that the disease tendency will die out of itself in the interval, and the relief be permanent — the patient be cured as well as the disease.

One island which is rising out of the fogs of the half-knowledge that envelops both these diseases is that asthma is not so much a disease of the lungs, or hay fever of the nose, as of one of the nerves supplying both these organs, and especially that group of nerves which is concerned with the control of the blood vessels and the blood supply, and hence known as the *vasomotor* nerves. Surprising as it may seem, neither of the diseases shows any very strong tendency to give rise to permanent or serious disease, such as chronic catarrh of the nose or tuberculosis of the lung. In both of them the extraordinary feature is that the delicate mucous membrane lining both the nose and lung may be, and usually is, in apparently perfectly healthy condition a few hours before and a few days or weeks after the attack. In both cases it is not an inflamed or diseased or congested condition which gives rise to the agonizing discomfort and sense of suffocation, but an extraordinary and abnormal susceptibility or "touchiness" of either nose or bronchial tubes. This makes them respond to the touch of some trivial irritant like pollen, dust, or peculiar smell, or a whiff of smoke, wind, or fog, by a furious explosion. First there is a sudden puffing up and swelling, and this is followed by spasms of all the muscles in the neighborhood. A soothing spray in the nose, a whiff of chloroform, a puff of the fumes from

niter paper, and the whole cyclone of wheezing, sneezing, and suffocation subsides as quickly as it came up. In fact, our greatest difficulty in finding out anything definite about the causation of asthma and hay fever was that patients never died of the latter and very seldom of the former, so that we had no opportunity of postmortem examinations. More puzzling yet, in those rare cases in which asthmatics died from some accidental cause during or just after a paroxysm their lungs were found to be in an almost normal or healthy condition, except a slight catarrh of the bronchial tubes of no greater severity than might have accompanied an ordinary influenza. Like rheumatism, there are few diseases that can produce so much distress and discomfort with so few serious or fatal results as do hay fever and asthma. Yet, for all that, often they make their victim wish he could die.

Of course, these hysterical spasms of their blood supply don't do either nose or throat any particular good. If they continue long unchecked, especially if the vigor or the general health of the victim becomes impaired from some other cause, they sometimes furnish a favorable seed-bed for one or the other of the milder infectious germs which are always prowling about, seeking whom they may devour, and we get a chronic catarrh in the one case and a chronic bronchitis in the other. These, however, like the condition upon which they are grafted, are pitched in a minor key, are usually mild in character, slow and exceedingly chronic in course, and seldom have serious or fatal results.

The widely-accepted belief that asthma tends to run into consumption has really but little foundation. Asthmatics may, of course, develop consumption, as is not surprising, considering that consumption kills from one tenth to one seventh of all those who die, but there is no evidence to show that they do so with any greater frequency than the average of non-asthmatic individuals. Indeed, many physicians with wide opportunities for observation believe that the asthmatic is actually less likely to develop tuberculosis than is the ordinary individual and sometimes enjoys a kind of "honor among thieves" immunity from this dread disease. Certainly it is rather uncommon to see a well-marked asthmatic become consumptive. Here is another little flake of silver lining for the asthmatic's cloud — a consolation to which he is legitimately entitled.

It is not to be wondered at that this belief should have grown up, for any one seeing an asthmatic at the height of one of his paroxysms of gasping and suffocation, with bulging eyes and straining muscles, is ready to believe him about to fall a prey to any form of fatal lung disorder. His one doubt about the likelihood of developing anything worse would be in the nature of the small boy's confident assurance that lightning never struck twice in the same place, "cause it did n't need to." One such calamity as asthma is enough for one human body! Some of the supposed connection between asthma and consumption has undoubtedly grown up from the very common, pathetic attempt on the part of the sufferer from tuberculosis to disguise from himself and his friends the seriousness of his ail-

ment by calling it asthma. So frequently is this done in the milder and longer-lived forms of the disease that in the far West, around the health resorts, "California asthma" or "Arizona asthma" is the vernacular term for consumption. But most fortunately the catarrh that develops after prolonged hay fever disappears when the hay fever stops, and the bronchitis which is grafted upon asthma will usually clear up or sink to comparative unimportance when the progress of the asthma is checked. So, if you have any sporting blood in your veins you need not hesitate in taking your chances with either. Anyway, most of us have to have something in the way of a handicap, whether mental or physical.

Another group of facts that go to support this nerve-explosion, "touchiness" theory of asthma is that asthmatics are exceedingly apt to be subject to other explosions of some character, such as nettle rash or hives after eating particular articles of food, sudden attacks of colic or indigestion from the same cause or without any ascertainable cause, painful puffings and redness over the joints — sometimes set down as gouty, sometimes as rheumatic — various neuralgias and sick-headaches. A considerable majority of asthmatics suffer from pains and "touchinesses" of this description.

Not a few asthmatics are subject to attacks of hives, which may even alternate with their asthmatic attacks, one seizure apparently taking the place of the other. Indeed, our most vivid and probably most accurate characterization of asthma was that of Sir Andrew

Clark — "hives of the bronchial tubes." If we could look into the lungs of the asthmatic when he is gasping and wheezing for breath we would very probably see a crop of itching swellings all over their lining membrane, swellings not unlike the familiar red and white wheals of hives, modified, of course, by the fact that they occur in the soft permeable mucous lining instead of on the firm, tough skin. At all events, "hives in the lungs" describes well what it feels like. Moreover, many asthmatics will tell you on close questioning that some particular odor, like that of flowers or horses or dust, some particular change in the weather, like fog or frost, some special article of food, like strawberries or cheese, or even some unpleasant mental impression or exasperation will bring on one of the attacks of wheezing and gasping. Not a little of the well-known beneficial effects of a change of climate or even of the house is due to getting away completely from the peculiar local odors of the neighborhood, the customary food, the monotonous round of daily duties with their recurring irritations, and the ever-recurring changes of temperature, moisture, and wind which gradually, and often unconsciously, have "got on the nerves" of the patient. Regrettable but true it certainly is, that when once the charm of novelty has worn off the new climate, the cure which the change has effected is likely to follow suit, although a fair proportion of these climatic cures are permanent.

A peculiar "touchiness" to some external irritant is the underlying basis in both hay fever and asthma; but though there be this inborn sensitiveness, it will not, so

to speak, explode of itself; it must be acted upon by some influence from without. Also, in most cases a fuse is required to convey the fire to the mine, so that we are beginning to find that almost every case of asthma stands, as it were, upon a tripod. Thus we have an internal mine of irritability, an external spark of odor, dust, fog, or what not, and, between the two, a fuse or irritable spot in nose, throat, stomach, or lung, on which the spark must fall to reach the powder.

Now, remembering the figure of the tripod, it is apparent that if you break any one of the legs of a tripod it topples over, and upon such a plan of strategy our campaign against asthma and hay fever is conducted. First, we search out and remove the external irritating influence, keep the spark from falling on the fuse. Second, we go over the entire body, but particularly the regions mentioned, and endeavor to discover the sensitive, inflamed, or otherwise diseased structure or area which serves as the tinder and fuse for the spark. Third, we build up the general vigor, balance, and resisting power of the entire system in every possible way. And thus we neutralize the explosive tendency.

Let us take the case of hay fever first, both because here the three factors can be more readily seen and separated, and also because a fair measure of success has already begun to attend our efforts for its relief. Here we have, as its name implies, a disturbance which brings the tears of agony to the eye in the balmiest and most radiant period of the year, the leafy month of June! The month in which we have the most delightful, ambrosial, and poetically-wholesome of all odors,

the scent of new-mown hay. As we know the malady on this side of the Atlantic, however, its name appears to be a misnomer; for, although its victims may experience trivial sneezing and redness of the eyes in May and June, its most exquisite agonies are reserved for a later and less delightful season of the year — from mid-August to early October. This is the stranger because hay fever is popularly regarded as distinctly an American disease, and, judged by the number of victims and vigor of its manifestation, this doubtful honor certainly belongs on this side of the Atlantic. But, like many others of our institutions, both good and bad, it was, in a sense, imported, or, at all events, was first discovered in Europe; and as the time of the year there at which the largest amount of irritating pollen and "sneezy" odors are abroad is early in the summer, and the pollen most active in its causation, that of the meadow hay (*Anthoxanthum odoratum*), it was properly and correctly termed: "Hay Fever."

When, however, the possessors of this exquisite poetic temperament, this capacity for "fine frenzy" on the part of their nasal mucous membrane, emigrated to this country or were born here with that precious heritage, they found that the pollen of our meadow grasses was not sufficiently irritating. But as this deficiency was more than made good by the pungent though utterly unpoetic pollen of certain of our late summer flowers and weeds — notably the familiar "ragweed" (*Artemisia ambrosifolia*), and goldenrod — they promptly transferred their periods of explosion to this later date. The disease was bad enough without

adding to its injury the insult of suffering from "rag-weed fever," so the European name was allowed to stand.

The first means of escape from this plague which suggested itself was, naturally, an exodus. It began at once and continues still, so that we have all seen it scores of times. The smitten ones rushed madly as though the angel of pestilence were upon their trail, fleeing up to the mountain-tops, down to the seacoast, to the mosses and hemlocks of the North Woods or the sands of the Dry Tortugas; to the green prairies of the Mississippi valley or the purple deserts of Arizona — anywhere, anywhere! to escape from the farmer and his plow. And most of them got relief. It was a matter of indifference where they went, so long as they got away from the plow-land with its grasses and parasite weeds, whether a barren island out at sea or a dusty desert on the shoulders of the Rockies or Sierras. But "the villain still pursued them." Not only had they to reckon with the relentless onward march of civilization climbing the mountains, clearing the forests, irrigating the deserts, with the rag-weed trotting along behind it, like a yellow dog under the wagon, but they carried the seeds of it in their own pockets, as it were. No sooner did a stretch of primitive forest or mountain-top or desert island begin to get a reputation as a hay-fever resort than enterprising persons promptly proceeded to build camps and hotels and boarding-houses for the accommodation of the sufferers. With the boarding-houses came inevitably garden patches, broadening to wheatfields and cornlands, even though they avoided

the deadly hay; and, one fine day, the asylum was broken, the pure air was tainted, and the health resort had to fall back on ordinary summer boarders for its profits.

A puzzling feature of the disease was that the results attained at these resorts varied widely in different individuals. Some would get relief, year after year, in the very same spot in which others would find their days one continued torture, and *vice versa*. A, who could n't get any relief at all at B's favorite resort, would go to another apparently no better in point of remoteness from hay-fields, and get immediate relief. This, coupled with the fact that the first round of sneezing in the yearly paroxysm would begin at midnight or at dawn of the tenth, fifteenth, or twentieth of August every year, gave ground for the belief that there was a strong mental element in the disease, and that suggestion and expectancy had a great deal to do with its attacks. Now, however, this has gone by the board completely, for it has been discovered that, while most hay-fever sufferers will react promptly to the pollen of any one of three or four flowers, such as rag-weed, asters, goldenrod, not a few of them will respond to the pollen of one flower and to that alone. So that, if this particular flower happens to be absent from the gardens, fields, and roadsides of a district, they may pass through August and September unscathed, even though wading through seas of rag-weed or goldenrod.

On the other hand, if their "*bête noir*" happens to be present among the native or imported flora of a hay-

fever resort, immunity will be a mockery and a delusion to them. Similarly, the almost calendar-like precision with which attacks will begin at or near a certain date each year is due to the closeness with which the blossoming of a particular flower will approximate to the same date each successive year. Just as the peculiar alternating rhythm of malaria was found to be due to the breeding cycle of the parasite that produces it, so the yearly rhythm and the extraordinary coincidences of hay fever are due to the blossoming of the flower whose pollen causes it. Mental influence is a great thing in some fields, but it has little to say in pathology.

But while civilization was destroying one refuge for the hay-fever sufferer with the best of intentions in the world, it was, without any intention at all, building up another one in the shape of those artificial deserts of brick and mortar — our great cities. In the heart of these one can be just as free from the flowers, pollen, and fragrant odors of the deadly country as upon the remotest mountain peak. Scores of hay-fever victims now can find surcease from their sneezing and dry their tears by plunging into the heart of the downtown district of New York, Philadelphia, or Chicago, where even the dust and the clang and the heat seem to them a small price to pay for relief from torture. And whatever other floral dangers roof-gardens, amusement parks, and summer theatres may contain, hay and its products are conspicuous by their absence. So that, with mountain-tops at one extreme and skyscrapers at the other, the hay-feverite who can afford the price of a ticket and can take his vacation in August, which is

fortunately the easiest season of the year to do this, usually can get fair relief from his temporary affliction.

Meanwhile, medical science had not been idle. Its first attack was upon the second leg of the tripod — the fuse or tinder upon which the pollen spark must fall to provoke the explosion. As this was obviously in the nose, a thorough campaign of nasal renovation and spring cleaning was begun at once. The results were encouraging. Many hay-fever victims were found to have marked abnormalities or diseases of the nose, such as tumors, chiefly polypi, bulgings and spurs upon the septum — the plate between the two nostrils — swollen turbinates, and special sensitive spots in various parts of the interior of the nose, the simple touching of which with a probe would bring on a furious attack of sneezing. Upon removing these growths and correcting the displacements of the septum or cauterizing these sensitive spots, fully one third of our hay-fever sufferers were markedly relieved, and some of them cured. It was further found that there were a variety of drugs which had the power of either deadening the sensitiveness of the mucous membrane of the nose or constricting its blood vessels so as to prevent the intense swelling. These drugs, if skillfully and intelligently used just before the expected date of the attack, would either abort it or keep it within very moderate bounds, so that the patient could still go about his work. A few of these, such as weak solutions of morphine and cocaine, though very effective for a time, were found to be only temporary in their effect and also exceedingly dangerous on account of their

poisonous effects and habit-forming possibilities. They were, therefore, abandoned by the profession except as a mere temporary means of relief to prepare the way for more radical and permanent treatment. But the knowledge of their effects has got abroad, and they, unfortunately, form the active principles of most of the advertised hay-fever and asthma remedies, whose ultimate effects are often literally worse than the disease!

There remain, however, a number of safe and fairly effective remedies, chiefly in the nature of constrictors of the blood vessels or soothing alkaline washes and unirritating local antiseptics, whose intelligent adjustment in skilled hands to each particular case will often give a very considerable measure of relief. In a disease like hay fever, which is usually limited to a certain definite and distinct period in the life of each individual, any means which can be devised to keep each successive attack within reasonable bounds of comfort and efficiency may be regarded as, for practical purposes, a fairly satisfactory cure, though leaving much to be desired on grounds of comfort.

But science had still another string to its bow. It has literally grasped the nettle and is engaged in a determined and already rather encouraging effort to wrest from the poison itself an antidote for it. Oddly enough, the most promising results thus far have come from the side of the Atlantic which suffers least from the disease. A European specialist, Professor Dunbar, had been experimenting in most painstaking fashion for years with pollen from scores of different plants suspected of causing hay fever, to discover which was

the real criminal. By careful experiments, first upon himself and then upon other volunteers, he determined positively that the attack of hay fever was produced in those susceptible to it by the pollen of seven or eight grasses and flowers, some of which have been already mentioned; and that no other pollen and no ordinary dust, however irritating, would produce these symptoms. As these pollen grains were covered with tiny spurs and prickles it occurred to him that possibly these, by their mechanical irritation of the mucous membrane, might be the cause of the trouble. But this possibility was disposed of by finding that water in which pollen grains had been steeped and crushed, when dropped into the eye or sprayed into the nostril, would produce an attack as promptly as the grains themselves. Obviously, then, there was some irritating principle contained in the pollen which produced hay fever. The thought occurred to him that if other poisons injected into animals will produce an antitoxin, why not this one? No sooner said than done! He injected rapidly-increasing doses of pollen into horses and dogs, took the filtrate of their serum, dropped it into the eye of a patient suffering the agonies of hay fever, and was delighted to find that it gave prompt relief. The remedy is still on trial, but reports from some two thousand cases in which it has been used show that it gave marked relief, and relief of a more permanent character than that of any other previous remedy, in about fifty per cent.

When it is remembered that hay fever is a peculiarly individual and personal disease, and is produced by

the pollen of twelve or fifteen different flowers and plants, it is of course unlikely that any single antitoxin would prove to be curative for more than from one third to one half of all cases. But we have every reason to hope that, when ten or twelve different forms of antitoxin against as many different kinds of pollen have been developed, the majority of sufferers will be able to find in some one of them a considerable measure of relief.

The case of asthma is similar to that of hay fever, only more chronic and less cheerful! The two diseases are so similar and so closely allied that asthma might be defined as a sort of periodic, lifelong hay fever, without relation to season or climate; and hay fever as a temporary, seasonal asthma. Almost any attack of hay fever that lasts long enough, beginning with sneezing and weeping at the eyes, develops into spasms of gasping and wheezing which are absolutely indistinguishable from asthma except that their cause is known. In addition to this, not a few who suffer from hay fever in early life develop asthma in later life, though this is usually one of the milder forms, and many sufferers from all-the-year-round asthma are subject to hay fever. In fact, the strong probability appears to be that asthma is a hay fever of the lungs, of which the cause has not yet been definitely discovered. Both diseases occur in the same neurotic, gouty, nettle-rashy type of individual and seem to have rather a preference for the higher walks of life. Both are relieved by the same class of remedies, chiefly nerve sedatives and blood-vessel constrictors. Both are due

to a spark falling upon tinder which transmits it to the powder; only, in the case of asthma the charge of powder is bigger and more easily inflammable, and both the spark and the tinder fuse are more difficult to discover and less important. In fact, in many cases any one of three or four different kinds of sparks may be sufficient to produce the explosion, and occasionally the asthma gun seems to get into a cheerful automatic habit of going off of its own accord. The fight against hay fever is a mere summer campaign; that against asthma is a *Thirty Years' War!*

Our artillery is directed against the legs of the same tripod as in hay fever, only the thing seems to have a provoking ability to stand on one leg. Even when we have excluded the spark and destroyed or dampened the tinder fuse, the asthma infernal machine in the lung, of its own sweet accord, will continue to explode at intervals. The attack of asthma is one of the most striking and unmistakable in the realm of medicine. The patient will be sitting quietly conversing or working, or he may have retired and be sound asleep, when suddenly he becomes conscious of a sense of tightness and constriction in his chest and throat. He tries to relieve this by breathing deeply, but instead of getting his breath again the sense of suffocation increases until it becomes almost intolerable, in some instances producing a fear of impending death by suffocation. The sufferer gasps for breath until his chest is pulled up into a condition of extreme expansion, then runs to the window or leans forward and clutches the top of a chair or the foot of the bed, as if to pull himself up out

of the bog in which he is smothering. Then, when his chest has been distended till it can hold no more, the rhythm of his breathing undergoes a curious change. Instead of his loudest gasp and intensest effort being concentrated on the attempt to breathe in air, by a strange reversal his inspirations become short and ineffective, while his expirations are enormously prolonged and wheezing and difficult. Although he is still suffering from an agonizing sensation of shortness of breath, his principal difficulty, to a spectator, now appears to be in emptying his lungs of the air which he has drawn into them. His face becomes red and suffused, his eyes bloodshot, and, in extreme cases, his lips purple or blue. In fact, to all appearances he is in the very act of strangling to death. Yet this extraordinary and agonizing performance will go on, not merely for minutes, but for hours at a stretch, without bringing him one whit nearer to death or relief. His gasping, labored breathing is interrupted at intervals by a short, sticky, aggravating cough. This gradually loosens and, about the time that the paroxysm reaches its height, which may be anywhere from twenty or thirty minutes to five or six hours — usually about two or three hours — the cough becomes looser and expectoration sets in.

As soon as this has occurred the paroxysm begins to subside, and most veterans of repeated asthma campaigns will assure you that if they could just get this mucus out of their lungs, and get the cough loosened up, they know that the paroxysm would subside at once. It is, however, almost certain that the cough and

the free expectoration later are merely symptoms — first, of the hot, itchy, dry, hivelike swelling which is taking place in the bronchial tubes; second, of its subsidence and the leaking out of fluid serum. Whenever an attack is aborted, as it often can be at a very early stage, the whole trouble will subside without the appearance of any expectoration of any importance.

Few things are more distressing either to experience or to watch than a severe paroxysm of asthma, yet an old asthma veteran will have the coolness and *sang froid* to punctuate the momentary intervals between his desperate gasps for breath with casual and even cheerful conversation. He is wretchedly uncomfortable, but he knows he is not going to die and that the attack will pass off in a few hours, whatever he does or doesn't do. Meanwhile, the cooler he can keep the better off he will be.

Now when you have this sort of "battle, murder and sudden death" descending upon you every day for two or three weeks at a stretch, with the knowledge that when it leaves you you will probably have an interval of from two to six months, but that Heaven only knows when that interval will come to an end and another cyclone sweep down upon you, when you know this it can readily be seen that life with asthma is not exactly "one grand, sweet song!" The marvel is that asthmatics stand it so bravely and philosophically.

While asthma, like necessity, knows no law, the attacks have a decided tendency to occur either in the

late evening or during the night, often having the cheerful habit of waking their victims out of a sound sleep about midnight.

Much the same lines of defense are open to the asthmatic as to the hay-feverite, but the weapons are far less effective and the outlook for victory more remote. The principal cause of the disease is the patient himself, and you can't very well either remove or eliminate him. The outlook for life is, of course, excellent. The asthmatic does not exactly bear a charmed life, though to watch him in some of his paroxysms you would think he did. But he does have a distinct tendency to live well on into middle life and often to a good old age, although he may, in the language of the apostle, "die daily." One consolation for the asthmatic is that death should have no terrors for him — he has suffered more in a handful of his paroxysms than nine tenths of the dying ever do.

Furthermore, the toughness and adaptability of the human constitution is something astounding, and while no one ever gets to enjoy asthma — as eels are said to get used to skinning — they do manage to stand an astonishing amount of torture and annoyance from it without either losing their efficiency or their happiness. Taking the toughness of the average asthmatic constitution into account, the outlook is an encouraging one to the extent that by careful and intelligent modification of the sufferers' health, surroundings, climate, and habits of life, combined with the skillful utilization of such remedies as we possess, a large majority of asthmatics can be brought into a state of com-

parative comfort, with the prospect of outlasting their disease.

Oldest and probably most effective is the method already alluded to in hay fever — change of climate. Precisely how this helps the sufferer we are still unable to say. Probably, as already suggested, it does so by removing him from all the petty physical, mental, and social irritations which, though harmless to normally thick-skinned individuals, "get on his nerves." One thing is fairly certain — a change is the principal thing, for every variety of climate yet discovered has been found to cure some sufferer of his asthma. But, of course, the change, in order to give permanent relief, must be for life, or, at all events, for a number of years instead of for a month or two as in hay fever. And like many other climatic improvements of health it is apt to diminish after the novelty wears off, so that many of this class of health seekers who have gone from New England to Minnesota, after a few years of complete relief, have been compelled again to take up their traveler's staff and go to the mountains. From their period of respite in Colorado they have been driven on to California; from there to Arizona and then down into Mexico. So that the word of warning to all who seek cure of asthma by change of climate is: first, to try how much good you can get by temporary changes of climate in various places within easy reach; second, if you get complete relief in a region, test it for at least six months and preferably a year before deciding to remove to it; third, make your removal in such wise that you will be comparatively footloose to undertake

another exodus in three or four years' time should your condition demand it. After all, a change of climate is the best, most reliable and most wholesome and healthful cure as yet known for asthma. Probably from one fourth to one third of all who resort to it, under intelligent advice and proper precautions, gain more or less permanent relief, and about half as many effect permanent cures.

The intelligent utilization of a modified form of change, such as changing from one house to another whenever the attacks come on, or even by having rooms in different parts of a county and moving from one to the other, will often make life fairly tolerable, even though it may not entirely relieve. There are thousands of healthy and prosperous people scattered all over the West, the Northwest, and the Pacific Coast who will tell you that they came out there originally for their asthma and either got entirely rid of it or reduced the frequency and severity of their attacks to such a degree as to make life happy. That's as much as most people can expect even with the best of health!

Another line of defense is that of endeavoring to discover and remove the external irritant that starts the sensitive lung to swelling and burning and wheezing. This, unfortunately, is a good deal like hunting a needle in a bundle of hay; yet patience will often do wonders with it, and in a fair though not very large percentage of sufferers they and their medical advisers together will be able successfully to ferret out the often apparently insignificant and even absurd irritant which set off the explosion. As in the case of hay fever,

the commonest of these irritants are smells and odors of different sorts, sometimes those of flowers or grasses, not infrequently those of horses, cats, dogs, or other animals. Sometimes it will even be the odor of a particular room, house, carpet, or garment. One asthmatic was reported to me by a colleague whose paroxysms were brought on by the odor of a Navajo blanket used as a hanging in her bedroom.

Next most common, but more difficult to discover, are particular articles of food, especially such as produce attacks of hives in susceptible individuals, like strawberries, shellfish, cheese. Lastly, but less frequently involved, are certain climatic changes like fog or frost or dry, dusty winds or the smoke from a leaky stove or drafty chimney.

Then we have to search for and attack the fuse or tinder, and this, as in the case of hay fever, is most frequently found in the nose, though eye-strain, digestive and pelvic disturbances may also play their part. The commonest disease condition in asthmatics is polypi, though any form of disease or deformity of the septum or the turbinate bodies, or cavities opening out of the nose into the bones of the head and face, known as the accessory sinuses, may be found to be present. Relief of these conditions by surgical or other means is of the greatest importance, and will not infrequently stop the attacks entirely for a long period, or make them very much milder when they occur. In spite of the great relief often afforded by this method of treatment, it is regrettable but true that the majority of asthmatics are only temporarily relieved by treatment

of their noses and throats, however thorough and skillful. Still, every improvement in a disease like this is welcome, and the correction of any diseased conditions of the nose and throat in asthmatics is abundantly well worth while.

There is a fair prospect that somewhere from twenty to thirty per cent may have their attacks stopped entirely by such treatment, and over half of them will receive benefit to the extent of making the attacks less frequent or less violent when they do occur.

Last, but not least, there is the management of the patient himself. This cause of the disease, obviously, cannot be removed entirely. But it can usually be very greatly modified for the better, particularly by such means as cold bathing and douching, living and sleeping in the open air, plenty of moderate but regular exercise, and an abundant, carefully-selected dietary from which all possible poison foods have been omitted. The open-air life and exercise in asthma cases are particularly important because they help to reduce or oxidize in a normal manner the poisons accumulating in the system which are probably the chief cause of the explosions. One of the great fathers of modern medicine, Trousseau, vividly and not inaptly described asthma as an "epilepsy of the lung," and certainly the same sort of measures which prevent the accumulation of "self-made" poisons up to the explosion point prove most effective in both these maladies. The judicious use of tonics, particularly those which affect the tone of the circulation, the heart and the vasomotor system generally, is, in skilled hands, often very helpful. The

main principle, however, and the most hopeful method of attack is to build up, train, and improve the patient so that he will forge ahead of and ultimately outlive the disease. Obstinate and persistent as asthma is, there is one thing tougher and more enduring yet, and that is the patient who has it.

CHAPTER VIII

FILTER MISCHIEF IN THE BODY: BRIGHT'S DISEASE AND OTHER KIDNEY TROUBLES

WE expect too much of our body. We abuse and neglect and over-drive it, treat it as if it were made of chilled steel and asbestos, and then marvel and grumble at it when it breaks down. To paraphrase the Psalmist, "Man born of woman is few of years and full of kidney troubles." When we say that we are fearfully and wonderfully made, it is our fearful liability to break down that we are thinking of chiefly. The real marvel is that the machine runs as well and as long as it does. Every other engine yet invented has to have its regular periods of rest for repairs, oiling, and cleaning, but our double cylinder, self-feeding and self-oiling body-pump, the heart, chugs steadily on day and night, "*ohne Hast, ohne Ruhe,*" with the regularity of clock-work for three score years and ten. Our best and most modern systems of filters have to be built in duplicate and triplicate, so that each of the filter-beds can be given a period of rest and cleaning and repairing at least every month. Our most elaborate systems of sewage choke and block constantly, and the life of the best-constructed of them is less than thirty years, even with constant care. Yet we have in the body a filtration apparatus which not only purifies to perfection every drop of the drinking water of our body-

"bugs," but also at the same time discharges the whole of our liquid waste from the body, without one moment's intermission day or night, cleans itself, flushes itself, and increases its capacity as the body increases in size, and runs "like velvet" sixty, seventy, eighty years.

Yet, because it is called the kidney and has no wheels in it that we can see go round and costs us nothing to operate, and the duplicate of it can be bought anywhere in a butcher's shop for ten cents, and served upon our tables in stews, we have anything but a high opinion of it. In fact, we are inclined to rather despise it as something vulgar and halfway indecent, and think that, in the language of the day, we have "a kick coming" whenever it breaks down under the strain, after thirty-five, forty-five, fifty years' faithful and loyal service.

The kidney is becoming of late almost as notorious an organ as the appendix. Like the quack who told a gaping patient, when he turned upon him after keeping him waiting in his consultation room for half an hour, "Now, you need n't tell me a word about your symptoms! I know all about your case! I've been looking at your kidneys through the back of my head for the last twenty minutes!" the American people, figuratively speaking, has its eye upon its kidney and, like the quack, it is looking at it through the back of its head, or some other equally opaque and distorting medium. The reason for this sudden interest in renal troubles is obvious enough. We are beginning to discover that we die of them rather oftener than we

have fancied. Owl-eyed statisticians solemnly assure us that while the death rate from tuberculosis and typhoid and diphtheria and the diseases of childhood is going down rapidly and encouragingly, that from diseases of the kidney, of the heart, and of the nervous system is going up with almost equal rapidity.

But there is nothing to become in the least panicky about; in fact, the two sets of death rates explain one another. What modern sanitation and the progress of civilization are doing is to save the lives of children who would have died of diphtheria or croup, and of young adults who would have been carried off by tuberculosis, or typhoid, and keep them alive to die of the diseases of middle and later life — Bright's disease, heart disease, paralysis, etc. We all must die of *something;* nobody really wants to live forever, although they imagine they do, and I see no reason to either expect or hope that sanitary science and preventive medicine will ever do more than shift the heaviest stroke of the death rate from, say under fifteen to over fifty.

Pessimists may question, "What is the use of saving a child from death at six, to have it die of Bright's disease at fifty?" But there is all the difference in the world between the two. The man who dies at fifty-five or sixty has lived his life, paid back the race for the pain of his bearing and the care and cost of his rearing, passed on the Torch of Life to the next generation and started it well on its way, and the end, whenever it may come, has no terrors for him. Death itself is nothing, a mere ceasing to live, painless, natural, welcome to nine tenths of all to whom it comes, a rest

after life's fitful fever. Our best immortality is the survival of what we have done to make the world better for our having lived in it. If we have n't done something of this sort by fifty, the sooner we die, the better.

So don't worry about kidney diseases. They, like diseases of the heart and of the nervous system and brain, are not becoming any more common than they were two hundred years ago, except in so far as more people are living to be old enough to die of them, and we have no real ground for complaint against any disease that attacks us after it has let us live fifty years.

Another reason, of course, for the apparent increase of renal troubles is that we have only become able to recognize them accurately and correctly within the past fifty years. It is only about eighty years since Dr. Richard Bright of the famous Guys Hospital, London, discovered and traced to its origin the famous and fatal disease which now bears his name as Bright's disease all over the civilized world. Even our German confreres speak of it in their pompous Latinity as the "*Morbus Brightii*."

But as he unfortunately did not discover at the same time any cure for the malady, — indeed he is reported, though erroneously, to have died of it himself, — the memory secured by attaching his name to it is scarcely a triumphant, or even a grateful one. Like the policeman in the *Pirates of Penzance*, "the physician's lot is not a 'appy one." His occupation is laborious, without chance of joining the Union and getting an eight-hour day, and though it has its compensations, it seldom leads to fame. Almost the only way a doc-

tor has of achieving immortality is by getting his name attached to some interesting disease, which he has discovered, or operation which he has invented; and to have one's name eternally associated with disease and distress is rather a questionable kind of glory. But this kind of fame, or none, is the doctor's alternative.

What Bright did was to point out that a certain type of dropsy, with shortness of breath, headache, attacks of convulsions and coma (prolonged unconsciousness) was caused by a disease of the kidney, signalized by albumen in the urine; shown by the fact that when the urine is boiled or nitric acid is dropped into it, a milky cloud or clot forms in it, from the coagulated albumen, — thus laying our first foundation for understanding diseases of the kidney, so that within sixty years we have learned how to prevent most of them. And though we cannot always cure them, we can so help the body and assist other blood-purifying organs like the skin, lungs, and bowels to do substitute duty for the damaged kidney, that life can be prolonged for years and even decades. We can't cure Bright's disease — yet, but we can keep the patient alive and comfortable and in good working condition for years and years.

Bright's disease is simply a badly damaged condition of that important blood-filter, the kidney, which may have resulted from twenty, yes, a hundred different causes. Like many other discoveries of the causes of things, our finding that a badly damaged kidney was responsible for Bright's disease simply led us

one step further backward in the chain of causation, and raised at once the inevitable question, What caused the damaged kidney?

It soon dawned on us that while the kidney was the chief sufferer, its disturbances were almost entirely due to poisons or infections which were brought to it in the blood which it was purifying. In the language of the day, it was "more sinned against than sinning."

In one sense the kidney is rather a simple organ. It has a perfectly definite duty, and, like "Captain Reece of the Mantelpiece," it does it.

To put it very briefly, part of our food, the fats and starches, are burned clean in the body to gas, or smoke, in the form of carbon dioxide and got rid of by the lungs and skin. Part of the wastes of our food and most of the wastes of our body tissues are given off in liquid form, or rather as solids dissolved in water, through the kidneys and the bowels. The business of the kidneys is picking out this solid waste matter in the form of urea and the urates, together with water enough to dissolve them and pouring them out of the body in the form of urine.

If these poisonous wastes are not picked out and discharged by the kidney, every part of the body soon feels the effect. One of the first of the body-stuffs to suffer is, naturally, the most sensitive — the nervous system. The patient begins to complain of headaches, not severe but dull and persistent and without any apparent cause. He begins to be drowsy and listless, and to complain that while he sleeps heavily his sleep does not rest him and he wakes up in the morning unrefreshed.

In about one case in ten this poisoning of the delicate nerves goes further, and the sensitive retina and then the optic nerve become involved. The vision becomes cloudy and poor, and if a pencil of light is thrown into the eye with an ophthalmoscope, and the inner coat of the eye examined, its clear, bright, healthy red is found to be streaked and mottled with dull, opaque, white patches. These eye changes seldom go on to complete blindness, though sometimes half or even two thirds of the vision may be lost. This dull, persistent headache with dimness of the sight is one of the earliest and most significant symptoms of the disease.

Next, and in some cases before the nerve symptoms, the cells of the stomach and digestive organs begin to suffer from the poisoned blood, and the appetite becomes poor, the digestion disturbed, and the bowels constipated. This is one of the reasons why errors in diet were for a long time regarded as the cause of Bright's disease, the real fact being that the dyspepsia and other disturbances of digestion which were supposed to cause the disease, were really early symptoms of its existence.

If nothing be done to check the process and get rid of the poison through some other body sewer, such as the skin or the bowels, then the deadly drama advances, the muscle cells of the heart become involved, the heart begins to weaken, the tissues of the body become waterlogged, causing the familiar puffing or swelling about the ankles and under the eyes and shortness of breath from waterlogging of the lungs.

At this point Nature will often rally her forces and proceed to adjust herself to the situation. Profuse perspiration will occur, sweating out some of the poisons, or a life-saving diarrhœa set in, providing another route for their escape, and the patient will pull himself together and live in this more or less handicapped condition for months and often years.

Obviously, though able to keep his head above water under favorable conditions, he has a narrower margin than before. Some day a sudden strain of some sort falls upon his hard-set system — a business reverse, a death in the family, a period of overwork or, much more commonly, an attack of some acute infection, such as a pneumonia, a bronchitis, or even a severe common cold, and the already weakened and dilated heart gives way under the strain and oblivion closes the scene.

In other cases, the gradual heaping up of poisons in the blood goes steadily on until one day the poisoned and stifled brain has reached the limit of its endurance. The patient suddenly falls unconscious and, after lingering for a few days, passes away. Many so-called strokes of paralysis or attacks of apoplexy are really the last act in the drama of Bright's disease. Truly, a deadly and until recent years an appalling and irresistible scheme of decay!

Fortunately, this painful picture is already becoming a thing of the past. Although we have as yet no means of positive cure of the disease, we have so many ways of palliating its symptoms and delaying its course — methods which, if applied at a sufficiently early stage

of the disease, may even check it altogether — that the outlook of the patient with Bright's disease today is good. He may live an efficient and fairly comfortable life for five, ten, or even fifteen years, and then die suddenly and painlessly as any one else might from pneumonia, bronchitis, heart failure, or apoplectic seizure, with a fair prospect that he may secure at any time an arrest of the process which will carry him over to a good old age. As the disease comparatively seldom develops in its persistent, typical form under forty-five or fifty years of age, this usually means a fair opportunity to round out one's life work and provide for the future generation.

This picture of the disease and its symptoms will probably strike many as, in the language of Mr. A. Ward, "like the play of Hamlet with the part of Othello omitted," for nowhere in the whole catalogue is any mention made of that famous and widely advertised and unfailing symptom of kidney disease — Pain in the Back!

Every one who takes his medical knowledge from the advertising columns knows that the one symptom which infallibly indicates Bright's disease, and which "Bog Root Bitters" or "Snorter's Safe Liver and Kidney Cure" alone can cure, is an agonizing pain in the back or stitch in the side. Graphically depicted in the familiar masterpieces of the half-dressed gentleman with trailing suspenders, clutching madly at the small of his back; or the modern *Mater Dolorosa*, in the pose of an early Christian martyr, with one hand over her eyes and the other dramatically pressed to her side.

The omission was intentional, for the "sure and unfailing sign," like the rest of that soul-terrifying list of symptoms prefaced by "Have you —?" and concluding with, "*Then* you have Bright's disease and only Ballyhoo Bitters can save you," seldom occurs in Bright's disease, though it may, occasionally, from the same cause as the headache, namely, poisoned nerves. In fact, popular impression to the contrary notwithstanding, there are few diseases of the kidney — and they, for the most part, sudden, acute attacks such as occur during the course of a fever or infection — which are accompanied by a pain in the back. Nine tenths of all attacks of pain in the back are matters of muscles, tendons, and nerves, and have nothing whatever to do with the kidneys.

The prime interest, of course, of Bright's disease centres upon its cause and the possibility of its removal, and upon this head we are able to speak much more hopefully than we were fifteen or twenty years ago, as our views in regard to it have undergone a very decided change.

When we first became aware that albumen in the urine was a sign of Bright's disease, we rather naïvely but not unnaturally were inclined to think that the loss of the albumen itself was a matter of importance, and to measure the gravity of the disease by the amount of albumen in the urine.

Albumen, it might be said in explanation, is a sticky, jellylike substance, like white of egg — which, indeed, is pure egg-albumen — present in the blood and in most of the tissues of the body, but which does not under

ordinary conditions pass through the kidney filter and appear in the urine. When it does do so, it is detected by the very simple method of adding a few drops of strong acid, or boiling, which coagulate or clot it just as boiling does the white of the egg, and produce a cloudy, or in large amounts, a flaky, almost gruel-like, condition of the urine.

It is a valuable food, and if it were to escape from the body in sufficient amounts might cause a serious loss of strength by slow starvation. But the first application of accurate measurements relieved our minds of this apprehension. For it was shown that even in the extremest cases the amount of albumen escaping in the urine was so small that the total loss during the day would hardly amount to more than two or three teaspoonfuls, barely the equivalent of a quarter of an egg or a slice of meat an inch square.

The next idea was that, inasmuch as the substances which are picked out by the kidney are almost exclusively the wastes resulting from the burning in the body of *proteins* or meatlike substances containing nitrogen, and rise and fall with the amount of these in our food, albumen in the urine was due to overstrain or overwork of the kidney from eating excessive amounts of proteid foods and particularly meat. As albumen is itself a "meat," or animal product, it was supposed to be a leaking through of excessive amounts of meat which we had eaten.

This, however, was quickly disproved by the discovery that the albumen which appeared in the urine was not the albumen of our food but the albumen of

our own blood and of the cells of our kidneys. In fact, it was not the imported meats which were involved in the trouble, but the native born, so to speak. Patients suffering from Bright's disease could be fed on large amounts of egg albumen or milk albumen or meat without increasing the amount of albumen in their urine in the slightest degree.

A little further experimenting showed, however, that there were two influences which would very promptly increase the amount of albumen in the urine in Bright's disease, and even produce it in perfectly healthy individuals. One was severe muscular work, and the other the attack of some acute infectious disease or fever. In fact, any influence which markedly increased the wear and tear of the cells of the body or poisoned them so that they broke down might produce albuminuria.

This led us to examine the urine as a matter of routine in all infectious diseases. We found, somewhat to our surprise, that from ten to thirty per cent of all cases of acute infections, like scarlet fever, diphtheria, measles, typhoid, tuberculosis, and even tonsillitis and common colds, would show from a cloud to a heavy deposit of albumen in the urine, usually during the period of convalescence.

In fact, in all these infections, particularly the diseases of childhood — scarlet fever, measles, and diphtheria — our greatest care and watchfulness is now exercised during the period of convalescence, because this is the time at which their germs and poisons may attack the kidney or the nervous system or the heart.

Like the Parthians of classic lore, they are most dangerous when in retreat, and we are too often roused from our happy dream of complete recovery by the discovery of an ambuscade in the kidney. Indeed, we now recognize that from two thirds to three fourths of our cases of Bright's disease are uncured inflammations of the kidney following one of the acute infectious fevers, which have either not been detected at the time or allowed to run on and become chronic. The best way to prevent Bright's disease is to check the spread of infectious diseases.

Thus the relation between kidney disease and food, particularly meat, is now generally regarded as much less weighty and important than it was at one time. The worst combination and the most fertile cause of Bright's disease is getting up and going back to work too soon after an attack of contagious disease, especially if the work be heavy, the hours long, and the food poor. Give Nature plenty of time and rest, and she will heal the damaged kidney and restore it to perfect working condition nine times out of ten. This, in fact, is the stage at which to cure Bright's disease, by stopping it before it has become chronic.

We have begun also to have doubts, from a practical point of view, as to the connection between food and renal trouble. Since meats produce more urea and thus throw more work upon the kidney than starches and fats, it is probably a good and judicious thing to cut down the amount of them in inflammations of the kidneys so as to give the inflamed organs a rest; yet this principle can easily be carried too far. Practically,

we find that such patients improve and do well for a few weeks, or even a month or two, upon a nearly meat-free diet, but after that they lose ground, fail in their nutrition, and go down even more rapidly than before.

In fact, it was found, as in most other diseases, that the diet which was best for the disease was the one which was best for the patient. Our tendency now in the treatment of Bright's disease is to put the patient on that diet which will best support and improve his nutrition, vigor, and resisting power, regardless of whether it be animal or vegetable. In spite of all that vegetarians claim, and can prove in a test tube, the painful and obstinate practical fact remains that there is no real, available substitute for meat which will keep up as it will the patient's strength, courage, and fighting power in a prolonged siege like Bright's disease.

Moreover, it must be remembered that the kidney cells are not picking out urea from the blood solely for the protection of the rest of the body, but feeding themselves at the same time; so that a diet poor in meat may starve and weaken the vigor and resisting power of the cells of the kidney just as it does that of the rest of the body.

In fine, the general tendency of expert opinion now is, that while it is helpful and advisable to give the diseased kidney periods of complete rest by cutting meat out of the dietary, these "vacations" should be neither too long continued nor too frequent, and that the best thing to do in a disturbance of health lasting, as Bright's disease does, for years and decades, is to feed

the patient liberally and judiciously and let the disease take care of itself.

A system of treatment which cures the disease, but makes the patient worse, is not of much practical value in the long run. "Feed the patient and let him fight the disease" is our motto in Bright's disease, as in tuberculosis, pneumonia, and a score of other maladies.

The most effective direct treatment now given in Bright's disease is in the form of prevention, by recognizing it in early stages and giving antitoxins, serums, or antiseptics which will either kill the germ which has caused and perhaps is still keeping up the inflammation, or neutralize its toxins and help the system to get rid of them. What we try to do in Bright's disease now is to search out its cause and, if not too late, remove or neutralize this.

Failing this we summon the bowels and the skin to do substitute duty for the damaged kidney, and wonderfully, cheerfully, and effectively do they respond. Urea will sometimes lie in flakes all over the surface of the skin after the drenching sweats of Bright's disease, like sea salt in dried-up beach pools.

The main relation between diet and Bright's disease is that unsuitable, unsound, or badly cooked food may produce disturbances of digestion, attended by putrefaction and fermentations in the food canal whose poisonous products get into the blood and are carried to the kidney. But these disturbances are now regarded as much more frequently due to the poor quality and tainted condition of the food than to an excessive

amount or an injudicious selection of any kind of sound and nutritious food.

The only remaining stronghold of the dietetic causation of Bright's disease is in that fine old bogey of pathological nursery tales, Gout, with its evil spirit, Uric Acid. To lay this uric-acid ghost completely would take more time and holy water than can here be afforded.

But the drift of modern opinion briefly is first, that meat does not cause excessive amounts of uric acid; and second, that uric acid is not a cause but a symptom of gout. And that the same cause, generally a mild or chronic infection, which produces the so-called "gouty kidney" produces also the uric acid.

One of the best diets for the gouty is red meats, fresh vegetables, and acid fruits. And instead of gout being the peculiar penalty of rich foods and high living, the poor have it just as frequently and as severely as the rich, only they cannot afford to stay at home from work on account of a sore toe or a swollen finger joint. The rich have more diseases than the poor chiefly in the sense that they have more time to lay off and enjoy them, and more money to pay doctors for listening sympathetically to the recital of their symptoms.

There is another way in which the devoted kidney may become diseased besides by the attack of poisons brought to it in the blood which it is trying to purify. The kidney, from the very nature of its work, is made up largely of blood vessels — probably two thirds of its bulk consisting of a fine network of arte-

ries, capillaries, and veins. The walls of the blood vessels all over the body are elastic and are under incessant strain, both adjusting themselves to the varying amounts of blood that are pumped through them and also, every second, to the pulse waves driven through them by each stroke of the heart pump.

As is little to be wondered at, after forty or fifty years of this sort of thing they are apt to begin to give way, and their giving way chiefly takes the form of losing their elasticity and becoming stiff, rigid, and finally actually brittle. So that one day, under some sudden strain, one of them will rupture and let the blood in it gush out, and we have what we call an internal hemorrhage. If this rupture occurs in one of the arteries of the brain we get "an apoplexy," or a "stroke of paralysis."

The blood vessels of the kidney are just as liable to undergo these stiffening and crumbling changes as any others; and this quickly blocks the filter and causes slow blood-poisoning by the accumulation in the blood of waste matters which the kidneys cannot get rid of. This slow crumbling decay of the arteries (whose technical name, *arteriosclerosis*, often gets into the newspapers nowadays) is one of the characteristic changes of old age. In fact, so far as we can define or localize the general process of bodily decay, it *is* old age. As the old proverb puts it, "A man is as old as his arteries." This arteriosclerotic change in the kidneys, usually occurring in middle or later life, is one of the commonest causes of the slower and more unmanageable forms of Bright's disease.

An interesting thing about this chronic arterial change is that, while largely due to the prolonged general wear and tear of life, it is now known to be greatly hastened, and may be brought on prematurely, by three great main causes.

First and commonest of these is *overwork*, particularly in the form of prolonged muscular overstrain. Men engaged in laborious occupations, such as lumbermen, porters, dock laborers, miners, and day laborers of all sorts, show far the highest percentage of this arterial decay at the earliest ages. Twenty years ago it was supposed to be the peculiar plague of the leisure classes and the sedentary occupations, but this was merely due to the fact that these classes alone were studied with sufficient care to discover it. Like most of the other "diseases of the rich," the poor have them just the same and even more frequently, only they cannot afford the luxury of diagnosis and treatment.

The next great cause of this arterial decay is the poisons or *toxins* of the different infectious diseases. In a series of some three thousand patients under fifty years of age taken in succession as they entered one of our great hospitals and were examined for arteriosclerosis, nearly forty per cent already showed this change. The whole number were classified into three great groups: those who had worked hard with their muscles, those who recently had had one of five or six common infectious diseases, — typhoid, tuberculosis, syphilis, et cetera, — and those who had used alcohol freely.

The results were illuminating, for of those who had

engaged in hard muscular labor nearly sixty per cent showed arteriosclerosis; of those who recently had had typhoid or tuberculosis, some forty per cent; of those who had had syphilis, some twenty per cent; while of those who had used alcohol freely some fifteen per cent showed this change.

From this point of view it would appear that excessive industry does more to shorten life in the majority of men than dissipation; but the group is too small to base such radical conclusions upon. Virtues sometimes seem as dangerous as vices, if not indulged in with strict moderation.

To sum up: Bright's disease and other renal disturbances are probably increasing somewhat. This is only because more of us are living to be old enough, so to speak, to have earned them.

The chief causes of them, apart from the necessary wear and tear of life, are muscular overwork for long hours, the attack of the infectious diseases, and the use of alcohol; all of which are perfectly preventable, and in fact are being rapidly prevented by industrial legislation, by sanitary improvements, and by the growth of temperance and self-restraint. In other words, civilization is curing, and will continue to cure, the diseases which it has helped to cause.

The damage done to the kidney by the infectious diseases usually occurs at a late stage of the illness, especially in typhoid fever, diphtheria, scarlet fever, and even in common colds. And this attack of the kidneys can usually be prevented or, if occurring, held within bounds until completely recovered from, simply

by keeping the patient in bed and on a milk or other simple diet all through the period of convalescence and until he has completely recovered from all danger of such an attack.

CHAPTER IX

THE UNWISDOM OF WORRY

IT is a matter of official record that care killed a cat, And if the habit of excessive introspective reflection could work this dire and fatal havoc upon a feline's elastic and easy-going temperament and ninefold lease of life, what could it not do to a mere one-lived "human"?

As Oscar Wilde cynically remarked: "Nothing survives being thought of too much" — not even, alas, the thinker! When we begin to carry our troubles to bed with us at night, and think about them instead of going to sleep, then look out for squalls! We have crossed the dead-line between wholesome and necessary "taking thought for the morrow" and the worry that kills.

A certain amount of thought is healthful, exhilarating, and the very secret of success; but there is also a form of mental exercise which we dignify by the name of thinking, which simply goes round and round in a senseless circle, like a squirrel in a cage, or a herd of Texas long-horns "milling" in a storm-panic, which gets nowhere and simply grinds the nerves of the thinker to rags and ribbons. It does no good to any one, neither the thinker nor the thought of; yet we don't seem to be able to stop it. In fact, we are often proud of our achievements in this sort of self-punishment.

This is another danger-signal. Whenever we reach a point where we can't let go, where a particular subject, like Banquo's ghost, "will not down," or where we just can't stop thinking about things, then we have lost what the physiologists call our power of inhibition. We may be sure that we are beginning to do our work to poor advantage, driving our intelligence with the maximum of friction and the minimum of speed, and that a "hot box" or breakdown of some sort is looming up ahead of us. So long as we are masters of our work, we do it well; when it masters us, we do it badly — and it's pretty sure to do us badly sooner or later!

But there is a reason for everything — even for such an unreasonable thing as worry. "As the bird by wandering and the swallow by flying, so the curse, causeless, shall not come." People do not worry out of sheer perversity or "pure cussedness." There is a cause somewhere for even this most irrational and wasteful of mental habits. Our dispositions, perverse and deceitful above all things as we have been taught to regard them, are a good deal like horses. They will not jib, or balk, or shy, or run away unless they have been ill-treated, or frightened, or overworked, or are diseased; though, if they have once started the habit, they may keep it up without adequate cause.

If we "humans" would treat our bodies as well and as considerately as a farmer does his horses, with regular hours for meals, with which no stress of work is allowed to interfere; regular sleep, regular grooming, and plenty of all three, we should hear little of worry

and sleeplessness and neurasthenia, and get just as much real work done.

A few unfortunates there are, both men and horses, who are born with "shipwrecky" nervous systems, and these furnish the worst illustrations of causeless worry, of persistent gloomy forebodings, or, with a slightly deeper degree of defect, of shiftlessness, perversity, and even crime. Though I would whisper it with bated breath, in New England, worry and overconscientiousness, at one end of the scale, and idleness and shiftlessness at the other, are usually symptoms of disease or of congenital defect. They should be treated with sympathy and medicine, both of mind and of body, instead of scolding and reprobation, let alone punishment.

Worry, in fact, is oftener a symptom of trouble than a cause. A perfectly healthy human animal, well fed, well rested, and worked within his strength, will not worry. It is only the disordered liver that "predicts damnation." A perfectly healthy man does not know he has such a thing as a digestion. A dyspeptic does not know that he has anything else.

Life, as a whole, is composed of at least nine parts of happiness and sunshine to one of suffering and gloom. The healthy mind sees it in its normal proportions. When the ten per cent of discomfort begins to bulk larger in our consciousness than the ninety per cent of comfort, it is a sign of disease, as well as a fruitful cause of more disease.

Don't scold yourself for worrying unnecessarily, or for wanting to cross bridges before you come to them,

but look sharply about to find where you are ill-treating that faithful, devoted slave of yours, your body. You will usually find that you have given him good ground for revolt and for causing your imagination to play jaundiced tricks with you, by overwork, by underfeeding, by lack of sleep, and, not the least frequently by lack of play, that literal *re-creation*, without an abundance of which no life can be kept sound and sweet.

We are not quite so sure as we once were of the color of sin, but we do know something about the chemistry of worry. For it is, at bottom, not simply a bad mental habit — though this has much to do with keeping it up — nor of sheer perversity, nor even a matter of the nervous system, but a question of the chemical composition of the blood; and, indeed, of half the tissues of the body. There was a shrewd substratum of truth in the ancient quip that whether life is worth living or not depends on the liver. The question of whether a thing which can be done only once shall be thought of but once, or reflected upon in advance sixteen times with foreboding, and thirty-two times afterward with regret or misgiving, is largely determined by the extent to which the liver and lungs have failed to clear the blood of its fatigue poisons.

Fatigue is now known to be produced not by absolute exhaustion, but by the presence in the blood of more or less definite poisonous chemical products of the activities of our muscles and nerves. Worry is the result of a dilute chronic fatigue. It may even be chemically defined as the psychic reaction of somatic satur-

ation with paralactic acid and monosodic phosphate. The important practical bearing of this is that in order to restore a fatigued muscle it is not necessary to build up anew its exhausted strength — to recharge its battery, as it were — but simply to wash its fatigue-poisons out of it.

Let a frog's muscle, for instance, be stimulated to the point of apparent exhaustion; then simply flushing out its blood-channels with salt and water, through its tiny artery, will start it contracting again briskly; similarly with the brain that is suffering from nerve-fatigue or worry. It is not necessary completely to rebuild and restore its energy, but simply to flush the fatigue-poisons out of it. For this there are two great agencies — rest and change of work!

Sometimes we are tired out all over, and then the only remedy is rest, preferably in the form of

> Tired Nature's sweet restorer, balmy sleep!
> Sleep that knits up the raveled sleeve of care.

But more commonly our nervous system does not go to pieces all at once like the "One-Hoss Shay," but in streaks and in sections. Fatigue is generally a local issue — like the tariff.

Often, when we worry, we are not tired at all in the greater part of our brain and of our body, but simply sick and weary in some distant and insignificant corner of our mind, from doing some monotonous little thing over and over and over again, until we are ready to shriek. Sometimes it is making balances come right; sometimes it is writing "your esteemed order received"; sometimes it is planning meals or washing dishes.

Whatever it is, it is the deadly monotony of it, and the prospect of its going on to all eternity, which is racking your nerves to the shrieking point. Whatever it may be, stop it! Stop it, just to show that you can, and to discover that the world will still keep on going round without it.

Worry is waste. As a matter of physiological book-keeping, it means that instead of simply spending upon an action the exact amount of mental energy which is necessary to do that action properly, and then forgetting it, you are pouring out from three to five times this necessary minimum. Your excessive labor will have no useful effect whatever. On the contrary, it is certain to produce perplexity and confusion, making you do the thing aimed at worse instead of better. As Shakespeare puts it in regard to a similar emotion: —

> Cowards die many times before their deaths;
> The valiant never taste of death but once.

Instead of being prudent and commendable, worry is the most extravagant and expensive habit in the world. It usually means either that you are trying to get twenty horse-power work out of a twelve horse-power machine, or that you are rasping and grinding some wretched little weak spot of a bearing or cog into a resistance which is throwing the whole machine out of gear. The inevitable result is the same in both cases — a break-down, either sudden and fatal, which is rarest and most merciful, or, more commonly, a gradual chronic decay, a growing old before your time. Work keeps us alive. Worry ages and kills.

Every one will admit, even the worrier himself, that

it is unwise to worry. The remedy would appear to be childishly simple — just stop it! But there's the rub; you try, and find that you can't. Like Mr. Atkins, in Kipling's ballad, you may be never so firmly convinced that "it never did no good to me — but I can't stop it if I tried."

It is practically useless to try to stop worrying by an effort of the will — you must remove the cause! If your jaundiced and bile-loaded blood floods your retina, making the sky appear green, and the faces of your friends a sickly yellow, it is little use assuring yourself that the heavens are blue, and the faces of your children rosy and fresh. To you they are green and livid, and will remain so until the bile is out of your system.

Of the two great causes of worry, it is hard to say which is the more potent. The most pitiful, and the most difficult to deal with, is the attempt to get more horse-power out of your engine than it was built to develop. Many good people cling to the delusion that a man can accomplish almost anything that he wills to, providing that he wills hard and persistently enough. Perhaps he can, in the sense that he is not likely to will for the seventieth time unless at least one of the previous sixty-nine efforts has yielded him some measure of success. The intensity and endurance of a man's determination are, roughly, in proportion to the results he is getting.

In the main, it has been proven a thousand times that the vast majority of men and women — like engines, or horses — have certain limits of achievement,

or endurance, beyond which they cannot be pushed, except for temporary spurts, without disaster. But what we will accept for the mass and the average, we flatly decline to apply to ourselves. We are eager to believe with Professor James that there may be somewhere, on some undiscovered peak of Olympus, "higher levels of energy," which may be tapped if we strain ourselves to the utmost limits of endurance, and then a little beyond. If such levels or reservoirs exist, they are as yet uncharted, and their existence entirely unsuspected by science.

But leaving this question out of court entirely, the important practical fact remains, that, *whatever our individual possibilities, we are not getting the best out of them by overdriving ourselves.*

Purely commercial bodies that handle a large number of horses, such as transportation and express companies, discovered years ago that, just as a matter of cold cash, and profit and loss, it pays not merely to feed horses well and give them plenty of rest, but to work them well under their full strength. In that way eight or ten years' service can be got out of a team that would otherwise break down and be sold to the peddler in five or six years.

Similarly, manufacturing companies, especially those who have regard for a steady product of uniform quality, and sustaining a high reputation in the market, have found that it pays in actual dividends not merely to provide for the proper housing and sanitation of their workers, and to pay them good wages, but to shorten their hours of work and provide gardens, parks,

theatres, play-grounds, and clubs for their proper recreation and healthful amusement.

Therefore, if you find that you are overdriving yourself, that you are taking your work home with you, that you can't get your mind off it, that you begin to doubt your ability to get through with it, pull yourself together and take stock! If the work in its entirety is too much for you, try to change to some other field of activity better adapted to your powers, or get back to the soil. If you're a misfit, a round peg in a square hole, don't be too proud to recognize your mistake. A change may make all the difference between constant friction and ultimate failure, on the one hand, and ever-increasing efficiency and success on the other.

If, as will oftener be the case, you have got into a bad or wasteful way of doing your work, think over the situation. Get a short vacation, if you can, to change the taste in your mouth, no matter where you go; then plan your day so as to get plenty of time for your meals and digestion afterward, and plenty of sleep. Observe your holidays as holidays, as religiously as you do your work-days; let nothing interfere with your play and your hours in the country.

In short, plan to put and keep yourself in condition to do the largest amount of work of which you are capable, in the shortest practicable time. The beauty of this method of work is that your capacity, instead of diminishing under it, will steadily increase, and your task become easier for you instead of harder, not merely up to forty years of age, but up to sixty or sixty-five.

If, on the other hand, as much oftener happens,

your worry is a sign not of "all-over" weariness, but of local or partial fatigue, then the remedy is easier. There was a world of wisdom in Mulvaney's remark to the raw recruit: "An' remimber, me son, a soljer on the marrch is no betther than his feet."

The breakdown of a single cog in our body mechanism, from deadly and relentless overstrain, will throw the entire machine out of gear just as completely as a broken piston. In most lives it is the deadly monotony, the everlasting daily doing of little things, that wears and kills, rather than overrush or overstrain.

We often speak of worry and of insanity as if they were modern diseases, utterly forgetful of the fact that two thirds of the primitive superstitions and religions were pure products of worry and baseless fear; and that to-day peasants and day-laborers contribute the highest percentage of their numbers to the wards of our insane asylums.

It is really appalling, when we come to consider it broadly — the narrowness, the monotony, the everlasting repetition of average workaday life; the prospect of performing the same petty duties day after day, month after month, year after year, with nothing to end it short of the Great Sleep. Variety is not merely the spice of life, but its salt, the very essence of its continuance. Intelligent recreation, interests outside of the daily grind, changes of scene — these are not merely luxuries, they are necessaries of life.

Not only will no child grow up healthy without play, but no grown-up will remain so without it. If one section of your powers has become self-poisoned and

narcotized from overwork, and another paralyzed from utter lack of use, what wonder that you are half dead, and begin to worry about the probable demise of the other half! Kill two birds with one stone by giving the unused side of you a romp and a chance to keep alive, while at the same time you are flushing the fatigue-poisons, which make all the handwritings on the wall spell disaster, out of the overused side of you.

I think that few men adequately realize the deadly monotony and endless trivial repetition of much of the life of their wives and sisters and daughters. They themselves have their business interests, their daily contact with all sorts and conditions of men, their trips to purchase goods and raw material, to visit customers, to attend their national and State associations. The town or section of the city in which they live has been selected as the best or most available place for the prosecution of their business, but it may be anything but ideal as a place to make a home, or to find congenial society and healthful companionships and surroundings for their wives and children.

The average American man is devotedly kind and even generous to his wife and family, but he often fails to understand how a home, which to him is a delightful place to rest and refresh himself for the real struggle of life outside, may become a place of deadly monotony to be tied up in all day long by an unceasing round of duties; the net result and highest achievement of years of unceasing work being simply to keep the household fed, the clothes mended and clean, and the carpets and curtains respectable.

Particularly is this the case in families where the brood has been reared and the children successfully started for themselves in life. The man's business and work still occupy and interest him. He is still making plans for the future and enjoying the successes of the past. His wife, on the other hand, is apt to feel, after the strain of motherhood and the responsibilities of the training of the family are over, that the keenest of her life-interests has, for a time at least, gone out. The routine of household existence begins to pall upon her; she begins to worry, to brood, to lose her appetite, to develop symptoms of illness, real or imaginary.

She needs a chance to get out of the harness for a few months; to see something of the great world outside of her own; to get a fresh grip on life, which will enable her to transfer to the world at large the interests and the care which have been concentrated upon her children. Whenever your wife begins to worry, buy the tickets and tell her to pack up for a trip to the great city, to the country, to Europe, to the South, to the opera season, to some art exhibition or convention — any of these is better than a sanatorium, and may save months of drugging and dosing at home.

The best and only cure for worry is to live an active, interested, vigorous, cheerful life, with plenty of interests outside of your daily work and in other people as well as yourself and with full recognition of the gospel of play. Keep up your interests, your work, and your hobbies, and you will seldom worry, and never realize that you're old — until you're one day suddenly dead.

CHAPTER X

HEADS AND HAIR: WHY WE GROW BALD

WE were all more or less bald once and did not mind it much, yet the fear that we may be so again fills us with panic and haunts us like a nightmare. We are sure that the loss of our locks will spoil our beauty, in spite of the unanimous testimony of those who knew us then that we were much better looking than we have ever been since.

It is really curious how warmly attached we have become to our hair. The other earmarks of our "second childhood" — the failing sight, the disappearing teeth, the shriveling muscles — we look forward to with comparative equanimity, or at least with resignation; but the thought of the loss of our hair stirs us to wild revolt at once. We may become old and feeble, but we *will* not be a guy! Gray hairs are dignified, poetic, even picturesque; but the bald pate, which glistens just as beautifully as they do and with a warmer, rosier tint, is a thing of horror which is taboo in art and anathema in literature — save in the Sunday supplement. Yet, to the dispassionate eye, one is quite as much like a crown of glory as the other. The singular feature is that our eyes, our teeth, and our thews and sinews are of great utility and most vital importance to us, while our hair has been of no earthly use, but rather a constant source of care

and responsibility. Think of the years that we have spent in brushing it, the nerve rack of keeping it "up," the incubatorfuls of eggs that have been wasted in shampooing it, and the fortunes squandered upon hair-revivers, scalp-tonics, and beauty-parlors! Small wonder that the ascetics of every age, priest and puritan alike, have agreed upon one thing, that this useless and extravagantly expensive nimbus of ours should be cut short, or shaved off altogether.

This brings us to the crux of the entire problem of baldness; namely, the human hair having no known utility in any degree commensurate with the amount of its development, we know neither what to do to "exercise" it, so to speak, and in that way restore its vigor, nor how to modify its conditions so as to promote its growth in any special and effective way. Its positive diseases the recent progress of medical science has put largely under our control, provided the remedies be applied early enough. But we must frankly confess that in a considerable percentage of cases the tendency to premature loss of the hair is something of which we know neither the cause nor the cure.

The situation is far more encouraging than it was a couple of decades ago and may be roughly summed up to the effect that one third of all cases of premature loss of the hair can be cured, one third can be prevented from getting any worse, and one third are almost unaffected by treatment. This is perhaps somewhat reminiscent of the ancient classification of diseases of the skin under three heads: those that sulphur will cure, those that tar will cure, and those that the devil

himself cannot cure. But it is the best that can be said at present.

This, however, is significant of the general vagueness and inadequacy of our knowledge concerning baldness. In fact, we have not even succeeded in agreeing upon a definition of it. It is, of course, obviously divisible into two great classes — the natural or senile, which comes as one of the symptoms of approaching old age, and the unnatural or premature. It is but natural that with declining years the hair of the head should waste and fall away, as do the other tissues of the body, notably the teeth and the epithelium of the special senses; but authorities are not agreed even as to what might be regarded as the normal time for this loss of hair to take place, some placing it as late as sixty years and others as early as thirty-five. It is a matter of individual peculiarity, like teeth, sight, and hearing; but, roughly speaking, the average man has a right to expect to keep his "thatch" unimpaired until forty-five, and little right to complain of the administration of the universe if it begins to "thin out" after fifty.

We have no figures of any real value showing the actual prevalence of baldness in a community either as a whole or in different classes and sexes. Statements upon these points must be altogether in the nature of estimates; and an estimate is based only upon the experience of the estimator. The records of our hospitals, even of those especially devoted to diseases of the skin, at which one would naturally expect to find many such cases, give us no help whatever, inasmuch as a large percentage of the bald accept their condition with in-

difference or as a matter of course, and would never dream of going to a hospital or of consulting a physician in reference to it; while the vast majority of those who do resent the condition and endeavor to cure it turn for relief to the advertisements and the beauty-parlors. So that we have absolutely no adequate data at hand from which to decide the question, first, whether baldness is increasing; and second, whether it is more common in the higher ranks of society than in the lower, or among brain-workers than among muscle-workers.

As usual, however, in matters where accurate knowledge is lacking, popular conviction is abundant and has no doubts whatever about the question. It is one of the commonplaces of every-day conversation to hear the statements that the hair and the teeth of civilized man are going to the dogs together, and that at the present rate the race will soon be both bald and toothless. There are few things more firmly held as articles of popular faith than the belief that there is some sort of antagonism between hair and brains, that the more highly the tissues inside the skull are developed the more likely are those upon its exterior to fade and disappear. I regret to disturb this latter conviction, because it is one of the chief consolations of the bald-headed. "There are two things, sir, that you never saw — a red-headed nigger and a baldheaded fool!" Or as a friend of mine, whose head had come through his hair at an indecorously early age, explained it, "'T is the burning brain beneath." There is, however, no valid and adequate evidence for this belief, and

there are several straws which appear to point in the opposite direction.

In the first place, while it seems probable, both upon *a priori* grounds and from such evidence as we possess, that baldness is somewhat less common among savages who still regard long hair as an adornment in both sexes, and whose scalps are continuously exposed to the elements, the hair thus actually being of some functional use as a protection for the head, there can nevertheless be no question that from a very early stage of civilization, certainly from the dawn of literature, the term "baldhead" has been in common use as an expression of scorn and derision. Moreover, the condition is referred to in the earliest proverbs of many literatures and races, always as an undesirable, but by no means unusual, consummation.

Then, too, wigs have been in common use all over the world from a very early stage of civilization. Much of their vogue must probably be ascribed to ideas of ornamentation and ceremonial, the effect produced by them being considered more becoming and more dignified than that of the natural hair, as was still the case within the memory of our own grandparents. Yet the "digs" that have been made at them and at their wearers from a very early period (the joke, for instance, of the elderly beau with the curly, raven locks, whose wig is dragged from his head by the fish-hook of the irrepressible younger brother, is at least as old as Nebuchadnezzar) clearly indicate that, while originally used as additional decorations, they quickly became adapted to concealing defects beneath; while fringes,

switches, bangs, false fronts, and "rats" have formed a part of the toilet accessories of the gentler sex from the days of the Pyramids.

The other belief, that baldness is more common among brain-workers and in the upper or educated classes than in the lower, is equally devoid of substantial basis. Of course the records of any specialist in the diseases of the scalp would show that a vast majority of those who consulted him on the condition of their hair were of the wealthier, and hence more highly educated, classes; but this is because these classes take this condition most seriously and have money to spend on attempts at its cure. Similarly this same specialist will state that he has a larger percentage of cases of baldness among his private patients than he has in his hospital clinics; but for the same reason this fact means nothing whatever as to the comparative frequency of the condition in these two social strata. Any one, however, can assure himself by a few days' observation that baldness quite frequently occurs at an abnormally early age among farmers, day-laborers, sailors, fishermen, and workingmen of all descriptions; though perhaps it is a trifle more common among those of sedentary occupations and among brain-workers.

At all events we may console ourselves with the belief that there is no adequate basis for our fears that the hair of civilized man is doomed, or that baldness is increasing in any very marked degree, or that the conditions of civilization are unfavorable to the health and vigor of the hair.

One of the things that first led us to doubt the reality

of this alleged increase of baldness was the utter worthlessness and inadequacy of most of the explanations which were advanced to account for it. The common impression which associates our thinning locks with the wearing of unventilated and tight-fitting hats, for instance, was exploded long ago. The class of men who wear their hats most continuously are the outdoor laborers — farmers, fishermen, etc. — among whom baldness certainly is no more common than among indoor workers and city-dwellers. Ascribing it to the pressure of the brim of the hard hat, whether derby or chimney-pot, upon the temporal arteries is little better than fiction, inasmuch as these arteries do not supply the region of the scalp in which baldness first appears. The alleged lack of ventilation from tight and almost water-proof materials is equally absurd, because the average city-dwelling male wears a hat for only two or three hours out of the twenty-four; and in its power of cutting off air and light and producing a sodden, ill-ventilated condition of the scalp a hat is not for a moment to be compared with the coiled mass of hair (to say nothing of the artificial additions thereto) worn for at least fourteen or sixteen hours out of the twenty-four by the gentler sex.

Finally, while the head-gear of the civilized male is far from rationalized, yet for unwholesomeness and uncleanliness it is not to be compared with the horrible coiffures, bonnets, turbans, etc., worn by savage or semi-civilized men. As a matter of fact, never in the history of the race has the human scalp been kept in a cleaner, more wholesome, and more healthful condi-

tion than it is on the male head of the twentieth century. So, instead of dreading a further deterioration of the hair, we should upon *a priori* grounds expect a steady and continuous improvement in its health and vigor.

Although there is still a plentiful lack of positive information upon the point, it is the opinion of most of those who are in a position to know that baldness is distinctly less common among women than among men. Why this should be so is one of the mysteries that enshroud the gentler sex. If the extreme length of the hair and its consequent distance from the centre of nutrition, the alleged drag upon the roots, and the prevention of proper ventilation and the cooling of the scalp count for anything, we should certainly expect absence or failure of the hair to be far more common among women than among men. While it becomes any mere man to speak with the utmost caution and diffidence upon such a mysterious and deceptive subject, yet we will probably be safe in stating that at least three times as many men as women become bald, both prematurely and naturally. Scientific dermatologists are practically agreed that, while a great many women consult them for real or imaginary thinning and loss of the hair, this thinning is far less common than among men, and that positive, absolute baldness of the billiard-ball type is decidedly rare among them. Curiously enough, there is also a difference between the sexes as to the region in which this thinning and falling of the hair begins and chiefly occurs, in man this being almost invariably the vertex

where the natural whorl shows itself in the hair, or some portion of the crown of the head. In women it is the temples and hair-line above the forehead. These regions are supplied by different arteries, but this gives us no light on the problem, as there is no known or conceivable reason why the temporal arteries should first fail to nourish their region of the scalp in the female and the occipital and the frontal arteries in the male.

The only explanation which has been offered is a somewhat curious and, at first sight, rather far-fetched one, and yet one which on biological grounds has considerable weight. This is based upon the universally recognized anthropological fact that the chief function of the human hair is not utility, but ornamentation. It belongs to the great group of what are known as the ornamental, or secondary sexual characters, such as the plumes and coloring of birds, the mane of the lion, the antlers of stags, etc. While it has a certain small degree of utility as a protection for the crown of the head, it is perfectly obvious that this function would have been just as effectually served by a short, thick, mossy growth, not to exceed an inch or two in length. Moreover, in the process of development in length and consequent capacity for ornamentation, it has, so to speak, deliberately got rid of the element most important for the purpose of protection against either wet or cold, that is the so-called under-fur, or pelage, which is present in the coat of almost every other hair-covered animal, reaching the highest degree of development in such fur-bearers as the mink and the seal. Traces of this under-

coat or true fur appear upon the human scalp at an early stage of its development, but are lost completely in the course of the development of the immensely elongated permanent hair. It might also be noted incidentally that the hair of the human head is practically an entirely new development, like nothing else in the animal kingdom, so that its pedigree is a short one, and this may account in some degree for its marked instability.

That hair was regarded chiefly as an ornament by primitive races needs no argument from any one who has the slightest familiarity with the manners and customs of any tribe of savages. Our Indian braves, for instance, spend no end of time in braiding and greasing their long black hair, and in decorating it with feathers, wampum, coins, and primitive jewelry of all sorts. Even such a highly civilized race as the Greeks, it will be remembered, combed and braided their long hair as a solemn, ceremonial preparation for battle. Indeed, it is not in the least necessary to go back to savagery for proof of the fact that our hair is regarded chiefly in the light of an ornament, for ninety-nine hundredths of the harm done by the most complete denudation of our scalps is the injury to our vanity and self-love. It is the abject fear of what we will look like and how the small boy upon the street will jeer at us, when we are bald and shiny, that spurs us to spend millions upon hair-tonics.

Here, however, a marked difference between the sexes comes in. While among savages and races in the earlier stages of civilization, as late indeed as the love-

locks of the Cavaliers, man as well as woman prized and cultivated long tresses as a mark of beauty and of dignity, for many generations now the majority of the sterner sex have thrown away such vanities and reduced themselves to a more or less "crop head" condition — not, of course, because we think hair is more becoming when worn à la blacking-brush, but simply that we have abandoned in disgust all hope of competing with the gentler sex in the matter of beauty. Why we should have so tamely surrendered our birthright is one of the mysteries of the universe, for by all the rules of precedent and history we were entitled to regard ourselves as the ornamental sex, as indeed is still the case almost everywhere throughout the animal kingdom.

However this may be, the upshot of the matter is that, we having for so many years scorned our birthright, and human hair having become entirely ornamental and practically useless since the invention of hats and caps, our wise and parsimonious Mother Nature, with the rigid economy which distinguishes her, has turned to other and more profitable uses the energy which she formerly devoted to growing the male hair long and keeping it on, and we lift up our voices in dismay when we find ourselves bald before our time. While woman, who has never for a moment abandoned her claim to a wealth of hair as her principal crown of glory, has experienced the truth of the Scriptural prediction that unto her that hath shall be given.

Practically, from a biological point of view, there is

this great difference between the sexes: While baldness in a man is no especial addition to his beauty or attractiveness, it in no way interferes with his success in life, including the most important part of it from a racial point of view, the finding of an attractive and desirable mate. On the other hand, the woman who in the spring or summer of life should become bald would have the greatest possible difficulty in finding a mate, or in keeping him afterward if she should secure him under false pretenses. So that, racially speaking, any hereditary tendency to premature baldness in women would be apt to die out with great swiftness.

It might almost be said that there is practically no real danger of more than one woman in a thousand losing a larger percentage of her hair than can be completely concealed by the kindly assistance of art; while on ninety-nine men out of a hundred who endeavor to rethatch themselves and assume a juvenility if they have it not, a wig is unmistakably a wig, even at forty rods.

But what consolation is there in this for the bald and the near-bald? They are concerned

> About de ha'r dat is n't dar
> An' why de ha'r am missin',

as the darkies sing about the possum's tail. Even if it be an evolutionary tendency, they want it stopped, if such a thing be possible. The outlook is not nearly so hopeless as might be supposed, although of course it is obvious that in a condition of whose causation we have so little accurate knowledge we cannot say much that is positive or definite in regard to its cure. More-

over, each individual case of baldness will depend very largely upon personal, individual factors, such as heredity, life habits, and general nutrition, and these can be elucidated and dealt with only through a thorough and careful examination and study by a competent expert. Broadly and loosely, however, it may be stated that while a certain natural tendency, often hereditary, is at work in a large percentage of all cases of baldness, whether actually premature or merely excessive for the years attained, this tendency is often markedly aggravated by certain individual or accidental conditions, the removal of which will markedly check or even arrest the process altogether. Nature has not the slightest sense of fair play, or the faintest scruple against hitting a man or a tissue, when he or it is down. Indeed, if there be any organ or region of the body whose vitality is lowered in any way, or which shows any tendency to decline, this is precisely the one that will suffer most heavily in any disturbance of the general health. Moreover, those tissues and structures, such as the hair, the nails, the teeth, and the skin, which are farthest from the centre of circulation are, so to speak, like the outposts of an army, very likely to have their supplies cut off or their communications interrupted. This is one of the reasons for the familiar fact that the hair, even in those who show no special tendency to baldness, will fall out more rapidly than normal, lose its lustre, and become thin and sparse in many different disturbances of the general health. In fevers, of course, it may be lost completely, but this form of baldness, fortunately, is almost never perma-

nent. The hair almost invariably grows in again and may even be improved by the accidental shedding, although in some cases its quality and thickness are permanently impaired. So that our dermatological experts find not a few cases of falling hair, particularly in women, which can be completely checked by correcting errors primarily of the digestion and secondarily of the liver and kidneys.

In another considerable class the chief aggravation of the tendency comes from the invasion of the weakened scalp and dwindling hair-follicles by some form of bacillus or bacterium. Contrary to popular impression, however, these germs are comparatively seldom the primary or chief cause of baldness. The healthy hair has a surprising degree of resistance to bacterial and parasitic invasion. Indeed, in young life, it is seldom that even the most furious attacks of parasitic organisms produce more than temporary baldness. Some of these are both distressing and disgusting in their effects, and may even affect the general health through the suppurative processes which they set up in the scalp, yet they comparatively seldom produce even temporary loss of hair. The nearest approach to this is that produced by the familiar ringworm (*Tinea*) of early life. So that, while in a certain percentage of cases the progress of the condition can be checked by the application of appropriate remedies to destroy the microbial organisms present, the indiscriminate application of strong antiseptics and germicides to the scalp is not only useless, but may easily do more harm than good, as most of these are highly irritating to living tissues.

In short, the main hope of stopping the advance of baldness lies in the direction of improving the general health and vigor, while at the same time keeping the scalp and the hair in a clean, antiseptic, well-ventilated condition. Unfortunately, however, the rewards of virtue are no more certain in this realm than in any other. Many a man who keeps his scalp as clean as a fresh-laundered table-cloth, and his bodily health in perfect condition, will still find himself the victim of an aggressive and progressive baldness. Indeed, the actual condition of the scalp and of the hair has very much less to do with the health of the latter than is popularly supposed. The bulbs of the roots of the hair go down completely through the skin and into the fatty layer which lies between it and the skull, and the thing that to the expert eye is really significant of the prospect as to progress or cure in a particular case is not the condition, or color, or cleanliness of the scalp, but the thickness or thinness of this fatty layer which underlies it. So long as this is present and the scalp is freely movable over the skull, there is hope of restoring a reasonable growth of hair; but when this fat has been absorbed and the shiny scalp sticks as closely to the skull as the cover on a baseball, the outlook is practically hopeless. This, of course, shows at once the futility of most of the local applications to and manipulations of the scalp, from which it suffers untold torments in those who are or imagine themselves to be becoming bald.

Most of the remedies which are so confidently believed in and applied to the scalp have about as much

effect upon the vigor of the hair as they would have if rubbed upon the soles of the feet. No known local applications or manipulations are capable of increasing the thickness of the underlying fatty layer when once this has begun to melt away, though skilled and regular massaging may help to delay its wasting. The strongest and most powerful curative element of scalp-tonics and hair-restorers is their smell, and the next most powerful their color. Most of them are frauds, pure and simple, and produce no effect whatever except upon the imaginations and the nostrils of their users. The most common constituent of them all is alcohol, and the next common probably ammonia or some aromatic oil or extract which has the double advantage of a powerful odor and of producing a mild sense of warmth and local irritation. All of this class are mild irritants to the skin and produce a slight temporary increase in the amount of blood circulating through the scalp; but this has about as much effect on the hair-bulbs as the beams of the harvest-moon have upon growing cabbages. Such slight practical utility as they may have depends upon the vigor with which they are rubbed into the scalp and upon the extent to which they promote cleanliness by virtue of their power of dissolving fats or other substances which may clog the hair. This last effect, however, may be very easily overdone, inasmuch as the scalp, like the rest of the skin, to be perfectly healthy needs to be slightly oily or even greasy. If it becomes dry and harsh it is much more likely to become diseased.

It is hardly necessary to assure any one of average

intelligence or sense of humor that the outrageous pretensions made by hair-tonics to "grow" hair five or six feet long are the purest of fairy tales. Any girl or woman who happens to have an unusually luxuriant growth of hair can make a comfortable income by allowing herself to be photographed as an example of "after using," or more effectively yet by sitting in some shop-window and exhibiting herself as a living example of the virtues of Humbugine.

It may, of course, be attributable only to the stupidity and ignorance of the medical profession, but certain it is that we know absolutely no remedy of any sort or description that has been proven to have the slightest direct effect in either increasing or checking the growth of the hair. The best cure, of course, is prevention. While we must frankly state that, for reasons already explained, it is by no means certain that prevention will always prevent, in a general way it is safe to say that those who keep themselves in good general health by sensible diet, plenty of fresh air, and plenty of exercise, and who keep the hair clean, well brushed, and well ventilated, will have done all they can toward the prevention of baldness and will be decidedly less likely to suffer from it than if they neglected themselves. On the other hand, it must be ruefully admitted that many a dirty savage, whose rule of diet is to eat all he can as often as he can get it, and to starve as stoically as possible when he cannot, who never takes any exercise between meals if he can help it, who sleeps in the vilest and most cave-like of huts, and who continually rubs grease, ochre, and

sticky pigments of all sorts into his hair and even fills it full of dust and wood-ashes to relieve the irritation of the parasites with which it swarms, has a perfectly magnificent head of the glossiest and longest hair, which he never loses until it is lifted by the scalp-knife of his enemy. So don't fuss with the scalp any more than is reasonable.

The rules of health for the hair, so far as we know them, are few and brief. Brush the hair thoroughly at least once a day, but let the scalp alone. Let the brushing be thorough and preferably with two brushes, which you may use as if you were currying a race-horse to get him into show condition. Keep the hair thoroughly clean in this way, and the scalp will largely take care of itself. Wash the hair as often as may be needed for cleanliness, which, as a rule, for men will be once a week, and for women about half as often. Avoid using too strong soaps, strong alkalies, such as ammonia and soda, and too hot water, as all of these take out too much of the natural lubricant, or oil, of the hair and leave it dry and harsh. As a rule, it is well to dry-clean the scalp as much as possible; and it is surprising how clean the hair and scalp can be kept just by thorough and regular brushing and currying alone. The most important detail about the washing of the hair is that it should be rubbed or brushed until thoroughly dry. If this be done, in the short hair of men there is no objection to wetting it daily or even two or three times a day if desired. The risk in leaving it not perfectly dry is that the natural oil of the hair, when mixed with water, rapidly decomposes or ferments, with the pro-

duction of the all too familiar and none too pleasant sour or half rancid smell of badly kept hair. This condition both irritates the scalp and furnishes a fine culture-medium for germs which thereupon promptly sweep in and give rise to the commonest form of dandruff or scaliness of the head. Particularly objectionable is the habit of wetting or "slicking" the hair in order to comb it, and avoiding the use of the brush altogether. The intelligently used brush is the best known hair-tonic. But when the vigor of the hair is beginning to fail, even this may be carried to an extreme and become injurious.

While it is well to keep the scalp dry and well ventilated and exposed to both light and air, there does not appear to be any valid ground for the belief that going bareheaded, particularly in the sun, in any real way promotes the vigor of the hair. Indeed, so far as we know anything about the intentions of Nature, the human head was never intended to be exposed to the direct rays of the sun at all. As a shrewd old Hindu proverb puts it, "Only fools and Englishmen walk in the sun." And experts are unanimous in declaring that an excessive exposure of the already thinning hair to the direct rays of the sun will not only not check the process but often accelerates it. I have seen a good many bald heads exposed to the no-hat cure on both coasts of this continent, but I never yet have seen any crop produced thereon that was visible to the naked eye, except blisters. Like the shoe, the hat, while a good deal of a nuisance in many ways and a frequent source of inconvenience, discomfort, and absurd extrava-

gance, is probably more helpful than harmful, not merely to the head, but to the hair. It should, of course, be kept within reasonable limits and made as soft, light, and porous as possible, but there does not appear to be any good reason for blaming the alleged decadence of our hair upon our headgear, however irrational and even absurd this may be at times.

CHAPTER XI

HEART DISEASE

THE human body is not like the "wonderful one-hoss shay." It practically never goes

> "To pieces all at once, —
> All at once, and nothing first, —
> Just as bubbles do when they burst."

Our great vital organs are not within thousands of years of the same age, so why should they be expected to die all at the same time? Our lordly Ego is not a person, but a parliament, not a monarch, scarcely even a republic, but a loose confederacy of equal and independent states. Its disruption and final dissolution is very rarely due to general decline and decay, but to a sudden secession, or even rebellion, of one of the Original States of the Union, the heart, the brain, the lung, stomach, or kidneys. The other great body state, the State of Mind, though it makes more noise than all the rest of them put together, is but a Territorial Representative in the Congress, with the right to talk, but no vote. In the language of Dr. Holmes's shrewd old philosopher deacon,

> "'T 's mighty plain
> Thut the weakes' place mus' stan' the strain ;
> 'N' the way t' fix it, uz I maintain,
> Is only jest
> T' make that place uz strong uz the rest."

It is usually the weakest or most tried State in the Body Confederacy which "lies down," or revolts, and the business of the thoughtful physician is precisely to "make that place uz strong uz the rest" — if he can. In the Game of Life, hearts are always trumps, and when the ace is played everything else falls. When the heart stops we stop. Not because our emotions can no longer throb and our passions burn but because — our pump is broken! Never, however, does it die save in the last ditch and usually by the treachery of some other organ, or after all others have deserted it. Our conscіousness may have fled, our senses failed one after the other, our stomach ceased to digest, our kidneys and liver to secrete, our lungs even to breathe, but our loyal heart throbs doggedly on, until either the cowards come sneaking back one after the other, to chase the retreating enemy, or it can struggle alone no longer and breaks. Then, and not till then, we die. Technically speaking, all deaths are deaths by heart-failure, because it is the last great organ to stop.

Yet we sometimes blame it for not standing the strain of civilization, because more and more deaths are being attributed to it in the health reports! What is really happening is that it, with sanitary and medical assistance, is carrying a larger and larger percentage of us through the food-poisonings of infancy, the infections of childhood, and the tuberculosis of adolescence, to die later, as we all must somehow, of the scars it has received in its battles in our defense. Whatever else we may deplore about ourselves we may be sure that our hearts are in the right place and doing their duty nobly.

The first thing to be clearly grasped in considering diseases of the heart, as of any other single organ, is that they are seldom the fault of that organ in particular. Indeed, they are much more frequently its misfortune, and due oftener to strains thrown upon it by other organs and systems in the body, than to its own inherent weakness.

In the majority of cases of heart disease, for instance, the lining, or the muscle, of the heart has simply become infected by the infected, or poisoned blood, which is being pumped by it all over the body. The heart of course is nothing more than a thick-walled, four-chambered bulb syringe which has grown up in the centre of that curious, closed pipe-line system of the body, which we call the circulation. The only point in which it differs from a bulb syringe is that instead of needing to be squeezed, or compressed by a hand from without, it squeezes itself and shoots out its charge of blood automatically, by the shortening of the muscle fibres in its own wall. It is a self-squeezing sponge with four large pores and valve flaps at each end of it to keep its contents from squirting backward, while allowing them to spurt forward.

Indeed the first heart in our own bodies was nothing but a pulsating muscle sponge, with its pores filled with blood, as it is yet in our distinguished antediluvian relatives, the clam and the oyster. It can grow up anywhere in the body, in fact in four or five places at once, and originally was not a single organ. Worms and leeches, for instance, have six to eight hearts; frogs five, horses and whales and bats have pulsating knots

of blood vessels in various parts of their bodies — supplementary hearts as it were, and we ourselves have the remains of pulsating sponges of this sort in our spleens, our kidneys, and our *receptaculum chyli*.

It had a single bulb to begin with, then it grew, for obvious mechanical reasons, into two, as it still remains in fishes, a third "bay-window" is built on, for the use of the lungs in frogs and reptiles; and finally a fourth in birds and mammals, including of course "humans." Whether it will ever become six-cylindered remains to be seen.

There is nothing in the heart which cannot be found in the smallest artery or vein. A wall, or coat of muscle fibres, which, by their shortening, pump on the blood; a lining of smooth, flat cells to prevent friction, are found in every blood vessel in the body. Every one of these tiny muscle fibres and rings plays its part in driving on the blood, and our heart is literally as big as our body and goes all over it.

The most effective way to remedy heart-mischief is to *treat the entire body*, and let the heart alone as long as possible. Play your long suit and save your trumps till you need them!

The only things that are new or original about the heart are the valves. These are little ridges, or folds, of both the muscular and the lining-coat of the bulb-syringe, which project ring-fashion into its inlet and outlet. Originally, when pulsations were slow and sluggish, they contained muscle as well as lining, as some of them do still in snakes, birds, and even some low mammals, and were thick and juicy enough to be as

alive and vigorous as any other part of the heart. But as the stroke of the heart pump became more rapid and its delivery more accurate and precise, these ridges and folds gradually became flatter, thinner, and more fibrous, until now in our own hearts they have become changed into thin, tough, parchment-like flaps of about the thickness of note paper and of a corresponding fibrousness and "half-deadness." They have thus become veritably "points of least resistance" in the heart, both on account of these changes and because they are subject to incessant movement and strain, snapping backward and forward, resisting the full power of the heart muscle, eighty times a minute day and night, so long as life endures. It is little wonder then that any invading germ, which gets into the body, and reaching the blood, is pumped through the heart, should manage to lodge in the little pockets, or angles, at the base of the valves, and find a foothold upon their leathery and half-vitalized fibres, producing what we term *valvular* or *organic* heart disease, or for short, *heart disease* proper.

Even an infection, which is virulent enough to attack the whole lining of the heart, setting up what is known as *endocarditis* — "within-the-heart inflammation" — (the unpleasantly familiar term "*itis*" means simply "inflammation," wherever found) appears to fall heaviest upon the attenuated tissues of the valves, half cut off as they are from their blood supply, and we get inflammation deepening to ulceration, eating away portions of the valve. Or if healing is secured before this, the scars that form in the process may twist and

distort the flaps, so as to render them quite incapable of closing the pump opening. In fact, the heart pump is mechanically damaged just as an ordinary kitchen or barnyard pump would be by cutting its valves, or by scalding, or drying them until they warp or shrivel.

As will readily be gathered, the most frequent cause of permanent heart disease is, not any defect or peculiarity in the heart itself, but simply its infection and attack by germs and poisons floating in the blood. Everybody, in fact, knows that rheumatism may "settle in the heart" and the veriest tyro in medicine will promptly inquire for a history of rheumatism, or rheumatic fever, whenever his stethoscope tells him that he has to deal with a case of valvular heart disease. But it is not so generally known, and indeed was not recognized in scientific circles until comparatively recently, that not merely rheumatism, but *any acute infectious disease*, or fever, may in the course of its invasion of the body, attack and cripple the heart. The rather loose and probably varied group of germ infections which we term rheumatism, still comes first in the list of heart-breakers, but it is closely followed by a number of others, particularly diphtheria, pneumonia, blood-poisoning or pus-fever, scarlet fever, typhoid, measles and whooping cough, even summer dysentery or diarrhea, and last, but by no means least on account of their enormous frequency, sore throats and "common colds."

In fact there is scarcely an infectious disease which, if it lasts long enough, may not attack the lining of the heart and leave a damaged valve as a legacy. This is

one of the most interesting new side-lights upon our campaign against the infectious diseases, for we are coming to be more and more strongly impressed with the fact that the damage which they do is not to be reckoned merely in the deaths which they cause — in fact this may be a minor part of their deadly influence upon the race — but also must include the scars and maimings which they leave in those who have survived their attack; scars in heart and kidney, in lungs and in nervous system, which their survivors will carry to their graves and which may even hurry them to this goal.

At all events, the first thing that the physician does when he is confronted with a case of heart disease, is to "*chercher la femme*" ("look for the woman in the case") in the shape of some infection or fever, even though it be but a summer diarrhea or a common cold. This is not merely of rational, but also of practical importance, from the fact that if the case is discovered within a few weeks or even a few months of the causal infection, we can endeavor to neutralize the action of its germ or toxin by an antitoxin, if we possess one, as fortunately we already do in the case of diphtheria, blood poisoning, and certain forms of rheumatism, or failing this, by such remedies as will promote the throwing off of the poison and the sterilization of the blood. If the condition is of too long standing for this, and the damage is already done and over with, still our knowledge of the germ causation of the trouble is of some practical value because it enables us to control and to some extent prevent the most serious danger which threatens the man

or woman with a damaged heart valve, and that is *a fresh infection*, not merely of the original germ, but of any sort.

Nature's fights in the great prize-ring of life are not only to a finish, but of the most remorseless character, and not even under rules of such modified brutality as those of the Marquis of Queensberry. Disease has, unfortunately, not the slightest compunction about hitting a man when he is down. On the contrary this is its unvarying procedure, and any disease which attacks the body, whether due to an invading germ, or to overstrain, or under-nutrition, will fasten itself in deadly grip upon whatever happens to be the weakest spot, or point of least resistance, in our bodies, with as fell a certainty as the bull-dog flies for the throat. You may live for ten, twenty, thirty years with a damaged heart valve, so long as you avoid all infections of every sort, literally, as if they were pestilences, both by sleeping and working in a gentle breeze day and night, spending plenty of time in the open air, avoiding all known sources of contagion, such as coughing and sneezing friends, stuffy, ill-ventilated rooms, and particularly public gatherings. Or when you are luckless enough to "catch" an infection, attack it vigorously with local antiseptics and eliminatives, such as your family physician will select as most suitable to your particular case.

Fully eight tenths of all valve-defects of the heart can be overcome or in technical phrase, *compensated*, so that a state of equilibrium is reached, which will last for years and decades, in fact until it is dis-

turbed by some form of overstrain, or under-nutrition, or advancing years, or by a fresh attack of some infection; and the last danger is coming to bulk larger in our apprehensions than all the former. To keep a clean heart, or rather a clean blood, is of as vital importance in pathology as it is in theology. How important these valve damages are may be gathered from the statement that in probably at least eight tenths of all cases of organic heart disease, the principal seat of the trouble is a warped or crippled condition of the valves.

This brings us to the other great group of diseases of the heart — those which attack not the mechanical, or valvular, part of the pump, but the propulsive, or muscular wall of it. We all know perfectly well what we have to do in getting water from a pump with a leaky valve, — simply put on more "elbow grease." This is precisely what is done by the heart in like case and consequently almost every valvular defect is followed by one of two things; either, if so great that the heart can scarcely overcome it, a dilating or ballooning out of its cavities, or if within its powers an increase in the power of its contraction, followed by an actual growth of the muscle fibres, so that the heart not merely becomes larger and more capacious, but thicker walled and stronger — in technical term, *hypertrophied*.

Just so long as this increased size and power of the heart-wall can be maintained, so long the patient will live. The moment that it begins to fail, he fails also. In other words our most important problem in "accomplished" heart disease, where the damage has been done and the infection and poisons got rid of, is to build

up and sustain the muscular power of the heart. This has radically changed our attitude toward and treatment of the man, or woman, with heart disease, in several respects.

In the earlier days of our knowledge and ability to recognize damage to the valves, we naturally concentrated our attention chiefly upon these, and as they were permanent defects, set about lightening the work which would be thrown upon them, and avoiding the possibilities of strain in every way. Our patients with heart disease were told that they must choose a sedentary occupation, which involved as little muscular exercise and strain as possible. That they must walk slowly on the street, get a bedroom, if possible, upon the ground floor so as to avoid climbing stairs, must take in fact just as little exercise as was consistent with earning their living and in every way lessen the work of the heart and conserve their strength.

We soon discovered however that, in the first place, this gingerly, soft-footed sort of a life was hardly worth living and our patients told us frankly that they would rather be dead than go prowling through life with one finger constantly on their pulse and the fear of impending death ever before their eyes. Then we found that patients with serious valvular defects had lived active useful lives for ten, fifteen, and twenty years, before it was ever discovered that they had heart disease, and that our patients who took the greatest care of themselves often died quite as soon, if not sooner, than those who took greater risks. Then it dawned upon us, as it had already done centuries before upon a great

mind in medicine here and there, that the heart was only a muscle that happened to be hollow and that like all other muscles it could be built up by exercise and weakened by disuse; and that if we wanted to increase the power of the heart muscle we must build it up as we would the biceps, by exercise and feeding. Then we realized what Sydenham meant, when he made his wealthy patients with heart disease get out and run behind their own carriages, and why an older father in medicine set them climbing mountains.

Though we cannot, by taking thought, add inches to our stature, we can add ounces to our heart, and all pure muscle, representing new "horse power." Our whole problem now is how to build up as quickly and as far as possible the muscular power of the mechanically damaged heart. The treatment in the beginning in extreme cases is of the mildest sort — mere movements of what is known as passive resistance, such for instance, as lifting up the patient's relaxed arm by the hand of the operator, and then gently resisting its tendency to fall back again to the side, thus calling the muscles into the mildest possible contraction to assist gravity. Then the exercises are gradually, almost insensibly, increased day after day until finally the patient is able to sit up and move about and take exercise on his own account. This is necessary in only extreme cases, with two or more of the valves crippled, or in the later stages of an old heart defect, where the heart's strength is being gradually worn out and compensation beginning to fail.

The vast majority of cases of heart disease, produced

as they are by acute infections in young or early adult life, have plenty of vigor and recuperative power in their heart-muscle which can be built up to almost any required pitch. So that it is not too much to say that the awful term "heart disease" which used to sound like a sentence of death and cause the sufferer to put his worldly affairs in order at once, has lost that dread significance and simply means a handicap which, under intelligent care and living, can be balanced for ten, twenty, or thirty years; often in fact until the patient dies of something else. There never was a better illustration than heart disease of the truth of the shrewd old Spanish proverb "Threatened men live long." As a philosophically-minded old colleague of mine used to put it: "Men with heart disease have a surprising faculty of living to act as pallbearers at the funeral of the doctor who first discovered it, and condemned them to death."

The recuperative, compensating powers of a healthy heart muscle are something almost incredible. But it must be well fed in order to grow and keep equal to its work. A damaged heart will live and keep the rest of the body alive with it, just so long as it is able to pump through its own walls a sufficient supply of rich, well-aërated blood. Here is the real crux of the modern problem of heart disease and the point round which our most serious difficulties centre in doubtful cases.

Laming of the heart muscle may be brought about in three ways, two of which are, unfortunately, often involved or implied, in the original damage to the valves. One of these is the direct poisoning of the muscle fibres,

followed by a greater or less degree of inflammation and decay, by the same toxin or germ which has attacked the valves. The second is injury by the same or other toxins to the walls of the tiny arteries which supply the substance of the heart itself (known by the absurd name of the *coronary* arteries), so that the heart's own blood supply is interfered with. Third, persistent overstrain from physical labor, especially if combined with under-nutrition and bad sanitary surroundings.

The first form of damage to the heart muscle (known as *myocarditis*) may occur, like inflammation of its lining, in the course of any infectious disease, but fortunately is much rarer. It is much more serious when it does occur, indeed is one of the commonest causes of death by heart failure, such as occurs in some infections, notably pneumonia. So serious in fact is it that it practically plays but little part in the question of chronic or "lasting" heart disease. Hearts with any considerable degree of *myocarditis* are scarcely likely to survive long enough to furnish any opportunity, or time, for compensation, and even if the unfortunate patient should apparently recover from the fever, he is apt quickly to go down under the first slight shock or strain. In fact our prognosis, or forecast, of the probable future of a case of heart disease is based much more upon the condition, and chances for maintaining the nutrition of the heart muscle, than it is upon the size and number of the leaks in the valves, except where these last are extremely severe. To paraphrase Louis the Magnificent, "the muscle, that is the heart!"

The most important single cause of damage to the wall of the healthy or of the crippled heart, and the one most difficult of practical adjustment is the strain thrown upon it by fatiguing and excessive use of the muscles of the body. While this kind of strain thrown upon the heart within reasonable limits is not only not injurious but helpful and curative, when carried beyond these limits it is damaging and injurious to the last degree. Work for the heart, like gymnastic exercise for the other muscles of the body, must, in order to be improving and upbuilding, be kept well within the limits of its strength and only increased gradually as these increase. Whenever these limits are exceeded and the strain persisted in, work becomes as powerful an influence for breaking down and destruction as it is in moderation for growth and upbuilding.

The sense of fatigue, of tiredness, is as we now know, only a symptom of self-poisoning, the piling up in our blood of the toxins produced by our own activities, the "choke damp" from those millions of tiny explosions which we call muscular contractions. In work within our powers our muscles produce poisons, but these are washed out by the blood, burned up in the lungs, and replaced by new liquid "dynamite" produced from our food and elaborated during rest and sleep. But when the work is so heavy, or the strain so prolonged and incessant, that this periodic flushing out and revictualing cannot be carried out, so that there is a steady piling up and constant saturation of these fatigue-toxins, then they begin to act like sewage in

the drinking water — slowly but with a deadly sureness and fatality.

Just as soon as the muscle of the damaged heart reaches a point where, from the prolonged and excessive strain thrown upon it by overwork of other muscles of the body, it is poisoning itself faster than it is being fed, it needs no prophet's eye to see what its ultimate fate will be.

While certain occupations involving heavy muscular strains such as coal heavers, expressmen, porters, dock-laborers, builders, etc., and others including constant severe muscular effort combined with exposure and long periods of unbroken toil in emergency, like lumbering or mining, must be avoided by the man with heart disease, in the vast majority of human occupations whether outdoor or indoor, it is more a matter of the incessantness of the strain, the hours of work, the sanitary conditions under which the work is done, and the food, housing, clothing, and recreation which he is able to give himself on the wages earned. A man with a moderate degree of heart disease can, fortunately, adjust himself to almost any, except a few of the heaviest and most taxing, industrial occupations, and to nearly any clerical, professional, or business career, providing that he can keep his hours within reasonable limits, get proper rest and recreation, and feed himself well.

Obviously, like any other living thing, if a muscle is to grow it must be fed and well fed, and this is the point of view from which our dietaries in case of heart disease are now constructed. That diet is best for a damaged

heart which will most abundantly maintain the nutrition and general vigor of the entire body; which means of course that it must be digestible and must not throw any undue or excessive burden upon the excretory organs — the liver, kidneys, or lung — but above all must be abundant. Our special and restricted diets in heart disease have almost disappeared, except in the very earliest stages when it is desired to build up the strength as rapidly as possible with as little tax to the digestion as may be, on milk, eggs, scraped beef, and such like; or in the later stages where from failure of the heart-pump, dropsy or waterlogging of various parts of the body is setting in, when a brief use of what is known as the "dry diet," limiting strictly the amount of liquid drunk and used in the preparation of foods, may prove helpful in draining the swollen tissues.

One of the chief reasons why patients with heart disease, who have to continue in employments involving heavy muscular labor, usually do badly and die soon, is the coarse, inadequate, and monotonous food, combined with the unfavorable and often unsanitary surroundings which their low wages condemn them to. While on the other hand the fifteen, twenty, or thirty years' survival of patients higher up in the social scale is due quite as much to the abundance of their food and the wholesomeness of their surroundings as to the lighter character of their muscular toil. It is well known, proverbial in fact, that we cannot control the heart directly, which was probably one reason why it was made the seat of the emotions; but indirectly, through the levers of work and food, we can make of it al-

most what we will — short of giving ourselves a new one.

The last great source of danger to the heart muscle in heart disease is the nutrition and vigor of the muscle-rings in the walls of the blood vessels all over every part of our body. The heart is of course only an extra large and specially shaped "bunch" of these and falls or stands with them in their vigor or decay. In fact we are coming to accord to them a larger and larger share in the work of the circulation. Their presence and action give the blood vessels all over the body the power of controlling their calibre. They can shut down until the part supplied by them becomes white and bloodless, or expand until it becomes red and swollen. Thus it is obvious that they can very greatly either obstruct or promote the flow of blood, and increase or decrease the work to be done by the heart. Not only so, but it is strongly suspected that when these little rings of muscle surrounding all the arteries expand to let the pulse-wave of blood driven by the heart pass through them, they do not merely mechanically recoil upon it as an Indian-rubber tube might, but throw some "heart" into their recoil and actively help to drive on the flowing blood. Be this as it may, whenever the muscles in the walls of the arteries and veins are paralyzed or seriously damaged, the heart quickly becomes inadequate to keeping up the circulation, is choked with blood of which it cannot empty itself, and dies in acute distension.

Furthermore, any condition which throws these little muscle rings all over the body into a state of

spasm, enormously increases the work of the heart, causes it to slowly dilate and ultimately thin and atrophy its wall until it breaks down and the patient dies of heart failure.

One of the commonest chronic decays, or degenerations, in the body is a gradual breaking down of these tiny muscles in the walls of the arteries and their substitution by fibrous tissue, with hardening and loss of elasticity, known as *arteriosclerosis*. This is one of the commonest changes, which takes place in old age as illustrated in the axiom that "A man is as old as his arteries." It may however take place either generally or in certain regions of the body at almost any age, from early adult life on. While we are still in the dark as to the precise, or even most frequent, causation of it, two factors play a very important part.

These are overwork or overstrain, whether muscular or mental, but particularly the former, and poisoned conditions of the blood whether produced by infections, particularly syphilis, tuberculosis, and malaria, or by alcohol and lead. In a sense these two causes may be reduced to one, inasmuch as they act by producing a toxic and unwholesome condition of the blood, which poisons the muscle cells of the blood vessels. The influence of overwork and overstrain, for instance, in producing this decay of the walls of the arteries is probably less from the actual physical strain that it throws upon them than by the chronic auto-intoxication by fatigue poisons, which it brings about. Although alcohol and lead both seem to have a special affinity for these delicate and important muscular

fibres, yet they both appear to act more powerfully through the general disturbances of digestion and metabolism which they produce, and which combined with their paralyzing effect upon the organs of elimination, particularly the kidneys, result in the piling up in the body of an excessive amount of waste and other self-made poisons.

Alcohol is peculiarly "Bad Medicine" in this form of heart mischief, especially when, as unfortunately often happens in those who are engaged at heavy manual labor at low wages, it is taken as a substitute for food, or as a means of adding palatability to a diet which is coarse, monotonous, and badly cooked, or attractiveness to the kind of life which accompanies such a diet.

Our next most careful consideration, after providing for healthful exercise and abundant food, is to, in every possible way, guard against and ward off the development of old age, in the sense of this decay of the arteries. Fortunately the same measures which will improve and build up the general health, and the same precautions against new infections which will protect the damaged valves from further destruction, are the measures best adapted to meet this danger, with the addition of the most careful attention to promoting and maintaining at their highest possible efficiency the activities of the liver, the kidneys, and the skin.

It further emphasizes the wisdom of building up the general nutrition and letting the heart alone in these conditions, that genuine heart disease may be produced in hearts with perfectly healthy valves and linings, by

persistent or extreme degrees of this *arteriosclerosis*. Partly from the loss of contractile power and partly from the narrowing of the calibre of the arteries, which occurs when their muscular coat changes to fibrous tissue, the work of the heart may be so enormously increased that it will first hypertrophy, or thicken and enlarge, then begin to dilate, with thinning and wasting of its walls until it is just as "inadequate" as if the valves had been destroyed. This is the type of diseased heart which may develop in the course of Bright's disease. In extreme cases indeed this ballooning out and expansion of the heart may go to such a degree that its openings become so distended that the perfectly healthy valves can no longer close them.

But this general decay of the blood vessels may also strike home more closely to the heart in a special and somewhat unexpected fashion. Contrary to what might be supposed, the heart does not suck up its own supply of blood, sponge-fashion, from the current that fills and passes through it, but is supplied solely by two small arteries given off from the *aorta*, or great main artery, just as it leaves the heart. Whenever this general process of arterial decay reaches these two small vessels it is obvious of course that the heart's own line of supply is cut off or seriously threatened, and the outlook becomes grave at once.

So long as these little *coronary* arteries remain untouched, the heart still has the power, or at least the possibility, of responding to the spur and rising to its task, no matter how severe may be the strain which is put upon it, or how extensive the process of decay in

other arteries all over the body may be. In some cases, fortunately, these arteries will escape decay for years and decades after those of the rest of the body have become involved. But in others they may become diseased first of all and these are the cases which develop that strange and exquisitely painful "heart-cramp" known as *angina pectoris*. Any condition which leads to the spasm, or blocking, of these tiny twigs may give rise to agonizing attacks of pain in the heart, radiating out into the shoulders, arms, and hands (as these are supplied from the same level of the spinal cord as the heart is), accompanied by an extraordinary and distressing sensation of impending death. This is the reason why this disease is so serious and so apt to prove fatal in the long run; though even these deadly seizures may occur for years, and especially if they be of the form due to spasm of the artery, throughout a considerable part of a lifetime. Sir Walter Scott, for instance, suffered from attacks of *angina* for nearly twenty years before the end came.

This *angina pectoris* is of special interest as forming almost the sole exception to the general rule, that, contrary to popular impression, heart disease is *seldom attended by pain* in the region of the heart. Stranger yet, it is not often accompanied by what is commonly known as palpitation — sudden irregular movements of the heart, which attract the attention of the patient himself. In spite of the fact that it is the classic seat of the emotions and peculiarly tender and sensitive, so that "cut to the heart," or "heart broken" are synonyms for the most exquisite refine-

ments of agony, the actual heart itself is singularly insensitive. Very few even of its most serious diseases produce much more than a sense of pressure and constriction of the chest, with shortness of breath. Even when its beats have become so irregular that no two of them are of the same force and every fourth or fifth one skipped entirely, the patient will not be conscious of anything wrong with the beating of his heart until he puts his hand upon his pulse.

The vast majority of patients who come to us under the impression that they have heart disease, are suffering from nothing more illustrious than gas on the stomach. This unromantic condition is also the most frequent cause of those sudden flutterings, or hop-skip-and-jump movements of the heart, which so terrify the nervous. The heart is separated from the upper surface of the stomach only by a thin layer of muscle, the diaphragm, and when it is ballooned upward by the accumulation of gases, due to indigestion, it very commonly first displaces and then produces a distressing and uncomfortable pressure upon the heart as well as upon the lungs. This is why most attacks of "heart pain" and palpitation can be best relieved by a dose of peppermint or other aromatic gas-expeller.

When the *coronary* artery has become damaged or blocked, we begin to get not merely a loss of strength and contracting power, but also a gradual decay of the heart muscle itself. If the muscle fibres break down and are replaced by fibrous tissue, we get what is known as "*brown atrophy*" of the heart; while if they change into fatty tissue we get the much better known

and more widely dreaded, but less common, *fatty degeneration* of the heart.

When the heart begins to fail and can no longer keep up the struggle, we get first shortness of breath from its inability to properly pump the blood through the lungs, then dropsy, or "water logging" of the tissues from failure of the central drainage pump. This usually involves first the feet and ankles, as these are the lowest points in circulation, where the sense of gravity is most felt, then the lungs, increasing the difficulty of breathing, then the liver, gorging and distending it so as to block and impair both the digestive power and the general power of resistance of the body against invading germs. By a merciful provision of Nature, the heart seldom fights out the struggle to the bitter end, but when the resisting power of the body has been reduced below a certain level the attack of some wandering infection, most frequently a pneumonia, or a bronchitis, or even an influenza, storms the citadel and cuts short the scene. These are technically known as "terminal infections," and are the commonest immediate cause of death in a great variety of slowly progressive conditions of disease and enfeeblement, including old age. They are Nature's *coup de grâce* — her "stroke of mercy" to put us out of our pain.

Another complication, which may and often does end the scene in heart disease, is of a somewhat unexpected character and that is the rupture or blocking of a blood vessel in the brain. It may not be generally known, but an *apoplexy* or "stroke of paralysis," is not really a disease of the brain or nervous system itself,

but of one of the blood vessels supplying it. Both forms of this are peculiarly likely to occur in heart disease, for during the original inflammation of the valves, or later in the process of healing, or in a secondary attack of *endocarditis*, little clots or fragments of fibrin may be washed off the surface of the diseased valves and floated along in the blood current until they reach some artery which is too small for them to go through and which they promptly plug up. Should this blocking occur in most parts of the body, say for instance, in the muscles or fat or even in the lung or liver, it would usually produce only a local and trifling disturbance; though if germs happen to be entangled in the clot they might set up a new point of inflammation, or an abscess. If, however, the clot happens to lodge in even a very tiny artery in certain areas of the brain, it will produce serious disturbance at once, ranging all the way from paralysis of some organ, or destruction of some sense, to widespread paralysis, or even immediate death. Later in the disease apoplexy, or paralysis, by rupture of a blood vessel, may occur because the process of general arterial decay has reached the arteries of the brain and changed their elastic muscular wall not merely into fibrous tissue, but even into calcareous, or chalky stuff, of extraordinary brittleness.

Barring, however, apoplexy and angina, there is comparatively little danger, in even organic heart disease, of that sudden death which its victims are supposed to live in the constant shadow of. Few diseases give louder and more timely warning of im-

pending danger than heart disease, and there are generally anywhere from six to a dozen threatening attacks of heart failure before the final one comes. Take care of your muscles and your stomach, and don't worry about your heart, is the best advice for those whom Fate has saddled with this defect.

As the heart is the source of supply for every organ and tissue in the body it is naturally, next to the brain, the most extensively connected "Private Exchange" in the whole body telephone-system. In one sense it deserves its reputation for tenderness, in that it is so exquisitely sympathetic with every imaginable disturbance that takes place in every other part of the body, and even with mental shocks and distresses. While its commonest and most serious disturbances are due to, literally, scars and bruises received in life's battle, especially the battle with the "bugs," yet it has a score or more of functional disturbances, due to influences exerted upon it through the nervous system by stresses in other parts of the body. Thus, certain drug foods like tea, coffee, and tobacco will, through their influence upon the nerves supplying it, throw it into a highly irritable and excitable condition; but such disturbances are neither frequent nor serious and usually only occur in a small group of peculiarly susceptible individuals, like those, for instance, who are poisoned by strawberries, shellfish, cheese, sage, etc., or from excessive use of the drugs. Their chief importance, in fact, is when they happen to fall upon a heart which is already diseased or beginning to be, when of course they may do serious injury.

Other curious diseases of the heart are accompanied by very marked changes in its rhythm, such as the "slow" heart known as *Bradycardia* (heart-block), in which the beats go down from the normal seventy-five to fifty, forty, and even thirty beats per minute; or at the other extreme, the "runaway" heart, *Tachycardia*, which races along at one hundred twenty, one hundred forty, and even one hundred eighty beats to the minute; but these, while serious when they occur, are so rare as to be rather among the curiosities of medicine. The last is associated with an over-secretion of the thyroid gland, and the former with a curious break between the auricles of the heart above and the ventricles below, so that the former may be beating twice or even three times as fast as the latter.

There is also one exception to the statement that diseases of the heart are acquired, not congenital, wounds received in hard battle in defense of the body rather than faults of its own construction, and that is a singular form of heart-defect with which some unfortunate infants are born, known as the *persistent foramen ovale*. During our life before birth, the blood from the right side of the heart, as it obviously cannot be pumped through the lungs, passes right on into the left side of the heart through an oval opening, or *foramen*, in the dividing wall. This normally closes at, or very shortly after, birth; but in about one child in a thousand it fails to do so, and consequently the impure or *venous* blood from the right side of the heart mixes perpetually with the pure or arterial blood of the left side, and the poor youngsters can thus never get their

blood properly aërated and purified, and have in consequence, blue lips, blue finger tips, and pale, ashy complexions, and gasp for breath on the slightest sustained effort. These little unfortunates are popularly known as "blue babies," and mercifully seldom survive for more than a few days or weeks after birth; though they occasionally linger on until the sixth, eighth, or even twelfth year of life before they succumb.

CHAPTER XII

SEA-SICKNESS

SEA-SICKNESS is one of those unfortunate maladies which are inherent in the nature of things. It is not caused by a bug — would that it were, for then we could run it down and kill it! It is not due to anything that we have done which we ought not to have done, or to anything left undone which we ought to have done. Its why and wherefore is simply that the sea is the sea, and we are land animals. The most striking characteristic of the sea is its fluidity, its perpetual motion, the fact that it won't "stay put"; and it simply transfers that characteristic to us and our livers and our dinners when we embark on it.

Sea-sickness is in one sense a mental disease, though, like most such, it is utterly incurable by mental influence. It is a violation of our most sacred confidence, the shipwreck of our faith, as it were, the shaking of our deepest and surest belief, that the earth beneath our feet is solid, fixed, immovable. When the plank substitute for this solid earth begins to dance and plunge and gambol beneath our feet like a school of porpoises or a frisky colt, then the foundation of all our beliefs and adjustments is broken up, the bottom literally drops out of our cosmogony. Our heads reel, our senses swim, our brain centres cry out in agony and call upon the ever-ready stomach to voice their woe.

Never shall we be able to cure sea-sickness, so long as the earth is the earth and the sea is the sea and we "of the earth earthy," unless we can invent some form of deck which will behave with the staidness and sobriety of *terra firma*.

This much it is important to grasp firmly for the understanding of our problem, that sea-sickness is not a matter of the stomach, nor of the food that is put into it, nor of the bile, but solely and absolutely of the brain in general, and of the balancing centres and mechanisms therein in particular. Any influence that disturbs these centres will produce this curious and almost absurd form of vomiting, whether it be the motion of a swing or of a railway train, or that external toxin of the yeast germ which men delight to pour down their throats, the toxins of a fever, the pressure of a tumor, or an earache, or a blow on the head. Vomiting of this sort is termed "central," from the fact that it is due to impulses sent out from the brain, and the stomach is merely the passive agent of the brain centres. Sea-sickness is literally "brain-sickness," due to the breaking up, the confusing, at one sweep, of all our preconceived notions of our relations to the visible and tangible universe about us.

I am fully aware that it is, at first sight, most difficult to believe that a malady which expresses itself so obviously and unmistakably through the stomach has really nothing to do with that organ primarily, but it is nevertheless true. Not only has the stomach nothing whatever to do with initiating the distressing series of events and sensations leading up to the rejection of its

contents, but its part in the tragic act itself is a purely passive one. Its powerful and well-developed muscular walls take no part whatever in emptying it of its contents — they only play the negative one of relaxing the bands which close the upper or gullet entrance of the stomach. Then the diaphragm from above comes down with a Wh-o-o-op, and the big muscles of the abdominal wall come up with a Wh-o-o-sh, and the contents of the luckless stomach are caught between the two and squeezed out like a minority stock-holder. The awful, agonizing gasp that precedes "playing Jonah" is simply the sucking in of air by our diaphragm in its downward swoop upon the stomach. Strictly speaking, you are not "sick at your stomach," but "nauseated in the region of your diaphragm." "Nauseated," by the way, is a peculiarly appropriate term in this connection, as its derivative meaning is literally "pertaining to the sea," or "occurring upon the sea," and comes from the same Greek root that enters into "nautical" and "navigate."

So you may rid your mind of the idea that any condition of your stomach or digestion, any food that you may have eaten or refrained from eating, or any disorder of the liver from which you may be suffering before embarking, can affect the fact or the degree of your sea-sickness. Obviously, any catarrhal or inflamed condition of the stomach that may be present, or any articles of diet that are specially irritating or indigestible, will be likely to render the stomach even more easily thrown off its balance, and make its sufferings under the fierce man-handling of the diaphragm

more severe. But apart from this there is absolutely no connection whatever between the stomach or its contents and sea-sickness. Eat anything in reason that you like before going on board, and the first thing that appeals to you when you begin feebly to hope that you are not going to die, after all — and you will suffer less than by either starving or dieting yourself.

When you have once passed the crisis and begun to adjust yourself, the most unlikely and indigestible of foods that taste good will be retained and digested, while before you have reached that blessed haven the mildest and most harmless of slops will be indignantly rejected. The experience of thousands of years has shown that remedies that act upon the stomach directly, such as pepsin and other digestives, aromatics, alkalies, champagne, bitters and stomach tonics of all sorts, have no more effect upon the malady than if they were poured down the back of the patient's neck. The only thing to do is to give the nerve centres the treatment recommended in the nursery rhyme for Little Bo Peep's lost sheep: Leave them alone and they 'll come home and bring the stomach behind them.

Though sea-sickness is chiefly a disturbance of the brain, the structure that suffers most severely lies just outside of that organ, at the base of the skull, in close connection with the organ of hearing. This is a very curious and ingenious little group of tiny canals, three in number, known from their shape as the semicircular canals. These canals are supplied by a division of the auditory nerve, and were for a long time regarded as a part of the internal ear. It was, however, discovered

some forty years ago that injuries or diseases which affected these tiny canals promptly produced a loss of balancing power on the part of the individual. Looking at them again from this point of view, it was quickly seen that each one of these tiny canals, filled with fluid and its interior bristling with delicate processes supplied by sensitive nerve twigs, formed a living spirit-level, and that their number — three — was for the purpose of providing one for each of the three dimensions or directions in which movement is possible — backward and forward, upward and downward, and sideways. If the backward-and-forward canal in a pigeon, for instance, were pierced with a needle, after the bird had come out from under its anæsthetic and was allowed to fly, instead of flying straight forward it would pitch head-over-heels in a headlong series of somersaults. If the up-and-down canal were pricked it would fall over backward; if the sideways canal, it would roll over and over from side to side. After a few days, when the prick had healed up, the bird would completely recover and fly and balance itself as well as ever. A congenital defect in the nerve supplying one of these canals gives a breed of Japanese white mice the curious habit of whirling round and round, and they are hence known as "waltzing" or "dancing" mice, and highly prized as curiosities. The characteristic has become hereditary, and crops out in their crosses in Mendelian proportions.

So delicate and accurate is the adjustment of these tiny spirit-levels that, even after we have been blindfolded and our ears plugged up with cotton, and are

laid upon a table delicately balanced on the top of a doll-head pivot, if our balance is disturbed by tilting this even a fraction of an inch we can instantly detect the movement and tell accurately in what direction it has occurred. If we remember that, walking or standing, balancing ourselves upright upon our two feet is the most delicate and difficult muscular feat of which we are capable, and that these tiny canals are on the alert every moment of our waking and sleeping hours to register every possible disturbance of our equilibrium that might threaten a fall, we are in a position to understand what calamities descend upon these organs of uprightness when we embark on the bounding billow. When a moderate breeze comes up, one canal is sure that you are falling down a well, another that you are pitching backward off a cliff, another that you are rolling over and over down a roof. All the time your eyes assure you that you are lying quietly in bed, though you know this is a lie. Is it any wonder that things happen?

Finally, they all shriek aloud at once at the top of their voices, each saying a different thing, and — well, you know the rest! "Getting your sea-legs" is simply, first, a realization that these various losses of balance are not going to hurl you headlong and break your bones; and second, that by crooking your knees so as to catch the deck whenever it happens to hit the soles of your feet, and giving your body a gentle roll to match that of the ship, only in the opposite direction, you can maintain a kind of an apology for an equilibrium — a sort of trial balance, as it were.

Years of this sort of thing have given the characteristic jovial roll and cheerful swagger to the gait of Jack on shore. The tendency to roll often persists for several days after you have regained *terra firma* and gives you the impression that good old Mother Earth is pitching and tossing under your feet like the rolling deck you have just quitted. If you are going to live "a life on the rolling wave," you must acquire a rolling gait to match!

It is, of course, obvious that the more conflicting messages your brain is receiving as to what is happening to your precious balance the greater the resulting confusion will be. This explains why, upon comparatively calm waters, some individuals will be made sea-sick literally through their eyes. That is to say, the slight rolling movements which are not severe enough to distress their semicircular canals will, if their not-overhearty assurances be contradicted by messages from the retina to the effect that the horizon is moving up and down, be sufficient to cause confusion and start the calamity. Under these circumstances, relief can sometimes be obtained by simply closing the eyes and at the same time lying down or reclining in a comfortable position. In severe pitching, however, which like the darkness of Egypt can be felt, this expedient is of no avail, and, except in mild, borderland conditions, the eyes have little or no effect upon sea-sickness, though they will, of course, aggravate the suffering if they are kept open, by providing another source of confusion.

Another factor which enters into this disturbance of

balance is our position. Generally speaking, sea-sickness is more easily produced and more likely to occur in the standing or upright position, and this is for two reasons: first, it is in the upright position that the maintenance of our balance is most difficult and requires most constant watchfulness and effort; second, that as the actual disturbance of equilibrium occurs in the head, the further the head is separated from the seat of commotion — the deck — the longer the lever by which it is hurled through space, and consequently the more violent the motion. A rough illustration of this upon a large scale is the much greater amount of motion and pitching that occurs at the crosstrees or top of a mast than on deck. Even on a comparatively calm day, passengers who can stand the amount of movement on deck with perfect comfort will be made desperately sea-sick in twenty or thirty minutes by climbing up to the crosstrees. The nearer the head can be placed to the plane of motion the less this amplification of the movement. So the recumbent position is usually the best one to assume in sea-sickness. The slight increase of movement produced by lifting your head from the pillow will, perhaps, increase the agony a trifle, and even precipitate an explosion which would not otherwise have occurred — but what is that in the depths of the abyss!

That the calamity is chiefly due to disturbances of our hard-won equilibrium, violations of our deepest sense of propriety, as it were, is shown by the curious immunity generally possessed by children, and to a certain degree by those who are entering upon their

second childhood, the aged. Children under ten years of age suffer but slightly from sea-sickness, and infants in arms, by a merciful dispensation, practically not at all. This immunity is evidently in direct proportion to the degree to which they have learned to walk and to the extent of that accomplishment. Their sense of equilibrium is still in a plastic and adjustable stage. They tumble and roll and pitch head downward and turn somersaults and fall out of things with a cheerful immunity from headaches, giddiness, or discomforts of that description, that makes them the envy of adult beholders. There may also be an ancestral element in it, "Intimations of Immortality," echoes of a previous stage of happy existence in the treetops, where swaying and pitching and tossing were normal conditions of life.

A somewhat similar immunity is possessed by animals, though this is not quite so complete. Cattle, horses, and sheep, shipped across the Atlantic, not infrequently suffer severely during rough weather and storms, refusing to eat, groaning and pitching about, or lying down persistently, apparently unable to stand up from giddiness, though they comparatively seldom vomit, as this is a very difficult performance with them on account of the peculiar construction of their stomachs. This disturbance sometimes becomes so severe in horses as to result in serious injury and even death, especially in thoroughbred horses with their highly sensitive nervous organisms. One member of the grass-eaters, the camel, is quite susceptible to *mal de mer*, and goes through the whole figure, including vomiting. The carnivora, cats and dogs especially, are

but little affected by the motion of waves, but in rough weather they, too, succumb and give a very perfect imitation of the real thing. One group of animals seems to be entirely immune, curiously enough, and this includes our nearest relations, the monkeys and the apes. This is probably due to the fact that they are natural trapeze acrobats, born circus performers, and the pitching of a ship would be comparatively mild contrasted with their headlong plunges from one tree-top to another, their seesaw rides on the slenderest branches, and their habit of swinging by their tails, head downward. Birds seldom suffer from sea-sickness, and appear to adjust themselves to the rolling of the ship as readily as to the swaying of the treetops in a gale.

Vomiting, though one of the most striking and disagreeable symptoms of sea-sickness, is only one of a dozen. Quite as frequent and almost as distressing is headache. This will often be the only symptom of the malady in calm weather or in partially-seasoned travelers. In some annoying instances it will not occur during the voyage at all, but develop with great severity after the victim has landed on the other side, and haunt him for days or even weeks. Another form of distress is severe neuralgic attacks, which may occur in the back, in the side, in the shoulder, or in one of the limbs. Disagreeable sensations, flashes of heat and perspiration, rapidly followed by shivering and coldness, are also very common. In fact, an exaggerated susceptibility to cold is probably one of the commonest symptoms of sea-sickness, from which very few travel-

ers, even the most seasoned and robust, entirely escape. Some, though not in the slightest degree nauseated, will be so distressed by it that they are utterly unable to keep comfortably warm on deck and are obliged to stay in their staterooms for the sake of warmth. This is why wraps and rugs of every description are in such constant demand on a sea-voyage. Very common, also, is a profound sense of depression, with or without melancholy. Even in those in whom it does not reach a disagreeable degree this feeling will produce an utter inability to concentrate the mind upon anything. Little mental work is ever done at sea.

Most of the benefit supposed to be derived from sea-voyages is due to the lively and refreshing contrast and sense of relief produced by the return of the normal state of mind and body when on shore once more. You are n't really any better than when you started, but you are so much better than on the way over that you feel as though you had gained ten or fifteen pounds.

That this distressing disturbance of balance, of our sense of equilibrium, of dignity and propriety if you will, is the real cause of sea-sickness is further shown by the fact that it is not even necessary to go to sea to get seasick. The familiar ghastly sensations of dizziness followed by nausea, which can be produced in many of us by swinging too high or too long in swings or merry-go-rounds, is of precisely the same character and, if the motion be persisted in long enough, will give rise to just as distressing sensations and eruptions. Many individuals, particularly women, will suffer exactly the same series of distresses from traveling on

railway trains, especially when the track is unusually curved and tortuous, as when going through mountains. Others will be similarly affected by long journeys in wagons or carriages. Particularly was this the case in the old-fashioned stage-coaches, where journeys were continued day and night; even strong, hardy men were sometimes made so wretchedly "stage-sick" that they would be obliged to break the journey for several days to recover. Travelers in the East who have undertaken long journeys on the backs of camels describe as one of the most uncomfortable experiences of the journey the agonizing attacks of nausea, headache, giddiness, and vomiting which come on about the third day of the trip, due to the pitching and swaying gait of the "ship of the desert." Our mental-influence friends, however, would probably challenge this illustration, alleging that the symptoms were due to suggestion and expectancy, because the travelers, knowing that they were to be carried upon a ship of some sort, naturally expected to be sea-sick.

It is frequently asserted that expectancy, vivid anticipation, and the firm belief that you are going to be sea-sick play a large share in bringing on an attack. This, however, is largely illusory and due to the fact that nausea is a purely cerebral symptom — indeed, almost a mental one — and can be produced by a score of different disagreeable sensations, notably, disagreeable smells or disgusting sights or sounds. Even such a purely mental impression as a sudden fright or the receipt of very bad news will make us faint and nauseated. Consequently it is not to be wondered at

that the mere occurrence of any of the rich sea-smells, or the sound of the wind in the rigging, or — in some exceedingly susceptible individuals — the sight of a ship or of the open sea will produce a momentary sensation of distress. I have even known some individuals who suffered frightfully from sea-sickness to be so sensitive that the sight of a vivid and realistic painting of a sea-scene was enough to make them cover their eyes and hurry past; others would shudder at the mere sight of a deck steward; and many would be almost made sick by the first whiff of the disinfectant which had been used in the basins and cans on shipboard. But that these preliminary qualms, these purely mental anticipations, will produce real sea-sickness, unless followed up by the necessary pitching and tossing, there is absolutely no evidence to show.

There are thousands and thousands of instances now on record of individuals who were firmly convinced, either from previous fortunate experiences, or from the assurance of their friends or physicians, or because they had taken some "sure-cure" remedy, that they were never going to be so silly as to be sick at sea, and who have promptly proceeded to suffer all the tortures. On the other hand, hundreds of phenomenally bad sailors who are even nauseated by the sight of sea-water in a bathtub, and who go on board with the firmest of convictions that no power under heaven can save them from being sea-sick, make a perfectly serene and comfortable voyage, if only the winds and the waves happen to be favorable.

A most curious fact about this condition is that our

adjustment to this new style of tight-rope balance is never absolute and complete. Take the grizzled captain or veteran boson of an Atlantic liner, who has followed the sea from boyhood and has hundreds of crossings to his credit, and put him aboard a pilot boat or a Gloucester schooner in a lively blow, and ten chances to one he will be heaving his very soul up in ten or twelve hours.

A friend of mine recently made the trip to Naples from New York in one of the great Mediterranean liners. From there he took a little local steamboat, scarcely bigger than a launch, for the island of Capri. The crossing takes a little over two hours. With him happened to embark the first mate and the purser of the liner, both of whom had a curiosity to see Capri. One of the sudden squalls for which the Bay of Naples is famous, or rather infamous, came up. Everybody on board, with the exception of the crew, became agonizingly sea-sick, and among the first to succumb were the two blue-coated, gold-laced, veteran sea-dogs.

What is even more distressing is the fact that certain luckless individuals, who for various reasons have elected or been trained to follow the sea as a means of livelihood, such as sailors, ships' officers, ships' clerks, and even officers and enlisted men in the navy, never quite get over being sea-sick. I have heard of four or five within the past year, one a yeoman in the navy, another a naval officer of many years' service, who were uncomfortably sea-sick for a few hours or days every time they went to sea, or would be more or less acutely affected whenever a storm came up. A classical in-

stance is the case of Darwin, who was so wretchedly susceptible to the motion of the sea that during the whole eighteen months of his now immortal "Voyage of the Beagle," which gave him his first brilliant conception of the Origin of Species and laid the foundation of his fame, he scarcely passed a single day, and never a week, without suffering from sea-sickness. Day after day he would sit with dogged persistence at the table in his cabin, working over his specimens, dissections, and notes until his reeling stomach and aching head could endure it no longer, and he would lie down on a couch alongside his work, to rise and return to the attack again in half an hour or an hour.

As for the treatment of sea-sickness, the least said the soonest mended. The only way to remove the cause of the malady is to stop the ship from pitching or throw the patient overboard, and neither of these is feasible, though, at certain stages in the calamity, some sufferers would almost welcome the latter. Fortunately, the demon of *mal de mer* is as harmless as he is vicious. Few things are more certain on this mundane sphere than that ninety-nine per cent of even the most acute sufferers from sea-sickness will recover their comfort and their self-respect in from two to four days, and that nine hundred and ninety-nine out of every thousand will be not a whit the worse for their distressing experience. Almost the only cases in which sea-sickness produces permanent injury are those of individuals who are either in the last stages of serious and fatal disease, or are suffering from conditions that render them liable to hemorrhage from the stomach or from

the lungs, or other conditions in which the mere mechanical strain of the violent and prolonged vomiting may produce dangerous results. The best and most philosophic course to pursue is to set your teeth, "lay low," and stand it until such time as Nature has adjusted herself to the situation. You will avoid nearly half the discomforts of the experience by strictly refraining from doing anything whatever to hasten the process of cure. Don't take anything for it; don't eat anything until you feel like it, and then only what you happen to fancy, not what some officious fiend in human shape assures you will be "good for you"; and don't attempt to go up on deck until you are able to stand up with comfort in your stateroom. There never was a baser mocker than the oft-repeated assurance that "the fresh air will do you good" in sea-sickness.

Little or nothing can be done for the radical cure of the malady except on the classic principle laid down by Drummond's *habitant:* —

> "Den de win' she can blow lak hurrican',
> An' s'pose she blow some more.
> But you can't get drown' on Lac St. Pierre
> So long 's you stay on shore."

Can anything be done to mitigate the agony? As we have already noted, diet, digestives, gastric tonics or sedatives, or any other methods aimed directly at the stomach or its contents are usually as worthless in practice as they are absurd in theory. One of the oldest remedies on record is the swallowing of a fish which had been taken out of the stomach of another fish! Any stomach that could digest that insult certainly

ought to be proof against *mal de mer*. But we grieve to state that the majority of the modern sure cures and preventives against sea-sickness are as rational in character and as effective in their results as this ancient prototype of theirs.

If the voyage is to be only for a night many even poor sailors, going on board in the late afternoon or early evening and going to bed at once before they are clear of the harbor, will be able to get to sleep and go through the night undisturbed, arriving at their destination next morning with, perhaps, no more than a slight headache. But this, of course, is only where no really rough weather is encountered.

On a long voyage there is not much virtue in these tactics, since you have to "have it out" with Neptune, so to speak, sooner or later. On general principles the best course, perhaps, for most travelers to adopt is to stay on deck as long as their comfort will permit, but to beat a hasty retreat to their staterooms just as soon as they feel reasonably sure that something is going to happen, without waiting to be too sure of it! They will certainly suffer less from the inevitable there than on deck, and get over it sooner. It will not infrequently happen that they will be able to go into a half-drowsy, half-comatose condition which scarcely distinguishes day from night and "dree their weird" or serve their time in that condition, without any very violent discomfort. Make up your mind that you will not be interfered with or interrupted by anybody or anything whatever until either the ship goes to the bottom or you feel better, and you will often avoid two

thirds of the acute agony of the attack. If you find yourself compelled to vomit drink all the water or soda water that you want. The diaphragm will empty the stomach according to orders from headquarters about every so often whether there is anything in it or not, and it is much more comfortable to have something there for it to work on.

The only remedies that have the slightest effect in either preventing or mitigating this calamity are those that deaden or dull the entire nervous system — the so-called narcotics and sedatives — opium and its derivatives, chloral, alcohol, and the bromides. All of these, however, except the last two, are such dangerous poisons in themselves and are so apt to be followed by unpleasant after-effects of their own that it is very seldom judicious or justifiable to use them as remedies against such a harmless disease. In fact, their use is almost entirely restricted to those rarer cases already referred to in which it is imperative to check the vomiting at all costs. Bromides and alcohol, however, have many enthusiastic backers, both popular and medical, and there appears to be little doubt that if any one is willing to saturate himself to the point of slight drowsiness and unsteadiness of gait with either of these interesting substances he can very much modify, and even at times entirely escape, the worst discomforts of sea-sickness.

Most of us would, I think, about as lief be nauseated and made unsteady on our pins by Neptune as by alcohol or bromides, and, when we further consider the later penalties that have to be paid in the shape of

of the all-too-familiar agonies of "the morning after," we would really prefer the disease to the remedy. However, those who suffer very severely and are willing to saturate themselves with bromides under the eye of their family physician can, in a considerable percentage of cases, escape to some extent at least the miseries of the voyage.

After the calamity has once fairly set in remedies of any sort are of exceedingly little value, for the obvious reason that the stomach cannot retain them long enough to allow of their being absorbed. In those cases in which headache and giddiness and depression are the principal symptoms a good deal of relief can be obtained by moderate doses of aromatic spirits of ammonia.

One of my friends who was a very poor sailor, but a most inveterate traveler, gleefully assured me once that he had discovered an absolute and sovereign cure for sea-sickness. "I just go straight down to my berth as soon as I get on board, Doctor, and tell the steward to bring me a hot whiskey toddy every hour until he finds me asleep. Then, whenever I wake I ring for another toddy, and in that way I go clear across the Atlantic without ever once being sea-sick!"

"But," I mildly expostulated, "don't you feel pretty wretched when you finally come up on deck?"

"Oh, I never come up on deck, Doctor. I just stay there and enjoy myself the whole way over!"

CHAPTER XIII

HOW WE GROW DEAF

SOME men are born deaf, some achieve deafness, and some have deafness thrust upon them. Broadly considered, the second class is far the largest of the three. We still take too many of our calamities lying down and fail to fight hard enough against our fate — not that we were much to blame for our fatalistic attitude toward deafness up to, say, a quarter of a century ago. Not only had we been taught from time immemorial to regard the dulling of the delicate sense of hearing as one of the inevitable penalties of advancing years, but the cure of deafness, after it has once been achieved, was — and, alas, is yet — one of the discredits, even disgraces, of medicine.

Even to-day the doctor is not very hopeful of curing deafness in the sense of restoring hearing which has been lost for any considerable length of time; but his attitude toward the condition has been completely revolutionized by the discovery that deafness does not come by chance or by some inevitable process of Nature, but is due to definite and well-recognized causes, three fourths of which are preventable. The great majority of cases, even of chronic and established deafness, can be prevented from getting any worse and usually improved a little, while nine tenths of all cases can be prevented entirely, either by avoiding their

causes or by taking them in hand as soon as the first sign of trouble with the hearing is noticed.

By the mercy of Heaven, the first attack of deafness is never permanent, with a few rare exceptions involving the nerve of hearing itself. The calamity gives fair warning of its approach — whom the gods would fain destroy they first make sneeze. Our hearing is lost, not all at once, or even half or a quarter at once, but by tiny successive fractions, each due to a fresh attack of the disease which causes deafness. And that disease, nine times out of ten, is nothing more formidable than our old friend, or rather most intimate enemy, a common cold, which travels up the tube to the ear from the nose or throat.

The motto of our crusade against deafness emphatically is: "Despise not the day of small things." The only way to cure deafness is to treat it before it reaches the ears. To fuss over the tympanum after you have neglected the throat is literally "to keep the promise to our ear, and break it to our hope" — to try to put out the fire after it has reached the powder magazine. The chief warning to remember in treating and getting rid of colds and catarrhs is that " all roads lead to " — the ear, especially in the later stages of the attack; that every little influenza germ, whose motto is Excelsior! climbs the Eustachian tube to the ear, and that every effort on the part of the invader to reach "the man higher up" lands him on the eardrum. Take care of the nose and the ear will take care of itself.

It is curious what picturesquely distorted notions prevail about the causation of even such common and

frequent misfortunes as deafness and blindness. Both have formed "high lights" in the classic picture of old age since the very dawn of history. The explanation was as simple as it was plausible and poetic. The dull hearing and dimming vision were due merely to the gradual wearing away and blunting of the keen edge of all the senses and powers of the body under the successive shocks of years and the wear and tear of life.

The auditory nerve was supposed to have been hammered and pounded, as it were, into a sort of stupor — the retina dazzled and flashed into a dazed condition where it could no longer respond to the rays of light. Deafness and the clouded vision of the old man were merely a part of the general scheme of decay — "sans hair, sans teeth, sans everything."

Nothing could sound more reasonable and altogether in accordance with what was to be expected. So long as we were satisfied to accept statements of how things were ordained to be, or inevitably must be, instead of taking the trouble to find out what they actually were, this was a perfectly good explanation, and it has been embalmed in the literature of all the ages; but, the moment we began to ask uncomfortable questions and to insist on finding out the facts, a totally different condition of affairs was discovered to exist.

Barely half a century ago, for instance, it was found that two thirds of the failing vision of old age was due not to any dulling of the retina or optic nerve, or dimming of the transparent parts of the eye, but merely to the failure of the little circular muscle within the eyeball; so that the eye could no longer adjust or accom-

modate itself to the light rays. Practically perfect vision, keen and sharp, though, of course, more readily tiring than before, could be restored by fitting the proper "specs" — that is, placing a glass or a lens before the eye to make good the failure of this muscle to act.

Half the remainder of the blurred vision of advancing years was found to be due to changes in the lens of the eye, known as cataract; and when the clouded lens was removed by a simple surgical operation, and a new clear lens of glass hung in front of the eye in its place, the retina was found to be as clear and sharp as ever. In short, the retina and the optic nerve of the old man of seventy were found to be practically as keen and as responsive to the light as they had been at seventeen; and a full third of the discomforts of old age were relieved at a stroke.

The same thing has been found in regard to the dull ear of old age in even higher degree. Not more than a fraction of a per cent of the deafness of old age is due to changes in the nerve of hearing. In other words, the hearing of the grandfather is at bottom as keen as that of his grandchild if only the sound waves can actually reach the keyboard of his nerve. In the economic jargon of the day, it is the "middleman" who is at fault — the conducting apparatus that lies between the sound waves and the organ of hearing, known from that fact as the *middle* ear — that is really deaf. Nine times out of ten, when you say a man is deaf you mean that his eardrum and its piano-hammer attachments are out of order.

Our hearing machine, though distressingly complicated in its details, is exceedingly simple in principle. Briefly, it consists of three parts, with a safety-valve attachment to one of them, known simply from their positions as the outer or external ear, the middle ear, and the internal ear. The safety valve is the joker that gives rise to nearly all the trouble. The division of labor between these three parts is matter-of-fact and rational.

The outer ear, as plainly follows from its position and shape, is merely a horn or funnel for catching the sound waves and conveying them into the interior of the head, where the middle ear lies warm, sheltered, and out of harm's way. The outer ear is really of the most trifling importance — little more than a hole leading down to the drum, with a more or less movable flap over its opening. The sole value of the flap to-day is as an ornament — and it is not exactly a howling success at that in some of us.

The middle ear is, in principle, equally simple and matter-of-fact. It consists merely of a tightly stretched disk or drum of skin, with a cavity in the bone behind it to allow it to vibrate. Across this cavity runs a chain of exceedingly delicate little bones which transmit the vibrations to the internal ear or organ of hearing proper.

This internal ear is vastly more complicated; but, as it luckily seldom becomes diseased — and when it does we do not know what under Heaven to do for it and have no remedy that will reach it — its makeup is of little practical importance. We may here dismiss it

with the statement that it consists of a singular little keyboard about an inch and a quarter long, coiled up like a snail shell — *cochlea* — made up of tiny rods laid side by side, not unlike the keys of a pianoforte.

The delicacy and elaborate perfection of the whole may be gathered from the fact that in its inch-and-a-quarter length there are five thousand separate rods or keys. Each of these keys is believed — though this is largely hypothesis — to vibrate in response to some tone or shade of tone that can be heard by the human ear; and their vibrations are conducted to the tiny twigs of the auditory nerve, which run along the under side of the keyboard and then unite into a small twisted cable, to pass to the brain.

Each key is supposed to pick out its particular note by vibrating in response to it, much as the receiving apparatus of a wireless telegraph responds to or catches the particular vibration to which it is tuned. It is probable, between us, that here is the site of those extraordinary differences in tone perception ranging from the born musical ear, with its delicate appreciation of the subtlest harmonies, down to inability to distinguish Old Hundred from Yankee Doodle.

Not a little of the painful and laborious process known as "musical training" — laborious for the pupil and painful for the neighbors — consists in limbering up and drilling the keys of this internal piano. They are taught to work separately from one another, so that the slightest deviation in tone, known as flatting or sharping, can be accurately distinguished; and also they may be given such simple and rudimentary train-

ing in arithmetic as will enable them to recognize when any note is struck which has two, three, or five times the number of vibrations of their own particular note, and to respond promptly thereto. This response to simple multiples or vulgar fractions of their own tone forms the basis of what we call harmony. In that last survival of the torture chamber of the Middle Ages — five-finger exercises — you are training not merely your stiff and unwilling fingers but the keys of this piano — a piano whose keyboard is coiled in your own head, or should be; but which often, so far as possibility of effective training is concerned, exists only — in the vernacular of the day — "in your mind."

The three parts of the hearing machine will thus be seen roughly to correspond to the parts of the transmitter of a telephone. The projecting mouthpiece is the external ear and the hole leading down to the drum; the diaphragm is the drum, and the little chain of bones behind it is the armature which changes the vibrations of the diaphragm into alternating electric currents; and the auditory nerve is the wire that transmits the message to "central."

It is well to have this general idea of the gearing of our hearing machine, both because the three divisions of it play widely different parts in the production of deafness, and also because the practical importance of the parts they play could almost be inferred from their position.

The outer ear, being little more than a hole through which the sound waves can reach the drum in its place of shelter and safety an inch and a quarter below the

surface of the head, plays almost no part at all in the production of deafness; in fact, the only way in which disturbances of this part of the ear could interfere with hearing would be by blocking or plugging it up completely — which, in the nature of the case, very seldom happens. Only two such accidents are known — tumors and accumulations of wax.

The other end of the apparatus — the internal ear — is so deeply imbedded and buried within the bones of the head, so completely protected from all possibility of exposure to attack, that it is literally one of the "safest" structures in the body; in fact, the only dangerous enemies of the keyboard and auditory nerve are the toxins of a few infectious diseases, which have a special power of singling out and attacking the brain and nervous system. For practical purposes, these may be reduced to two — one fortunately rare, the other more common — cerebro-spinal meningitis and blood taint. Could these two diseases be wiped out — and they are both preventable and one day will be prevented when we become intelligent enough — we should practically get rid of all deafness due to diseases of the keyboard and nerve of hearing, known as *nerve* deafness.

This leaves the middle ear, or drum cavity and its attachments, as the weak link in our chain of hearing, the region in which nearly nine tenths of all cases and forms of deafness occur. The particular Ethiopian in our middle-ear woodpile, however, is that wretched little tube connecting the drum cavity with the throat, called the Eustachian tube, after the fine old father of

anatomy who first discovered and described it. It might almost be called the deafness tube, for it is literally the leak that lets in the flood — the underground passage through which our germ enemies can crawl and worm their way into the very citadel of our fortress of hearing. Then, once they have effected an entrance, they block up the passage that admitted them and proceed to be fruitful and multiply, torturing the defenseless drum and the delicate lining of the drum cavity until they weep literal tears of agonized exudation and pus, thus raising the pressure in that tiny prison, until every little nerve twig in it, trapped and jammed against its bony walls, shrieks in agony. Then we say that we have an attack of earache.

If the enemy be sufficiently numerous and vicious the tension will continue to rise in the drum cavity, and the pain will become more excruciating until the bacillus bomb literally explodes, either by rupture through the drum and discharging a gush of "matter" from the outer ear, or by blowing out the débris with which it had obstructed the Eustachian tube behind itself and pouring back harmlessly into the throat.

Though this is the most painful and furious form of attack upon the middle ear, it is neither the commonest nor the most dangerous. Contrary to popular impression, bursting or perforation of the drum is not a dangerous accident, nor is it often followed by permanent deafness or even serious dulling of hearing. Every time there is a discharge from the ear in childhood this process has occurred; yet, as every one knows, not more than one case in fifty of "running from the ear"

is followed by permanent deafness. Instead of its being difficult to heal up the opening in the drum, our greatest trouble is to keep it open long enough to allow complete emptying of the cavity and clearing up of the inflammation within. Just as soon as the discharge ceases, the hole in the drum heals up completely, leaving only a slight scar, and the hearing quickly becomes as good as ever. A puncture of the drum will heal as readily as a cut or scratch on the skin and leave no discoverable scar. So there is no need to fear deafness for life because there has been an explosive or a "relief" perforation of the drum.

This is not by any means to say that rupture of the eardrum is a mere trifle. It is anything but that. The hole made may be large and ragged enough to leave the drum permanently distorted and tied down by the scar, so that it will never vibrate properly afterward. Moreover, on account of the fact that the drum cavity is separated from the brain by only the thinnest plate of bone, the inflammation may push inward, so to speak, instead of bursting outward, and cause a serious meningitis or brain abscess; or the inflammation may spread to certain cavities in the skull just behind the ear — known as the mastoid cells, and set up the now famous mastoid abscess, which also threatens the brain. So that the only safe thing to do in cases of severe earache, whenever the inflammation has gone above a certain height and refuses to yield within a few hours to warm douchings and other local treatment of that sort, is to call in the ear specialist and puncture the drum with a delicate knife-pointed needle, so as to

allow the matter or pus to escape harmlessly into the outer ear.

Pus in the drum cavity is literally between the layers of the bones of the skull and may leak upward or inward into the brain or backward into the mastoid quite readily. Usually it works into the large spongy cavity in the mastoid — the bump behind the ear, phrenologically known as "the bump of destructiveness" — and there gathers force for its attack on the brain. So that the moment the bump behind the ear begins to swell or redden, or become tender to pressure, it is time to call a surgeon. Then trephining or chiseling down through the bone to the hollow where the pus is will let it out and save the brain from attack. This is a serious operation, but better than a brain abscess.

The middle-ear attack, which most commonly leads to deafness, is the one which produces little more than that sensation of fullness in the ears and woodenness or dullness in the head, which so frequently follows an attack of sore throat or influenza. Here the germs are fewer in number or less vicious in temper, and do not make themselves so disagreeable as to stir up an inflammatory revolt of sufficient violence to "fire them out" bodily. They succeed in establishing either a permanent foothold or in setting up a slow, thickening, fibrous inflammation of the drum and of the mucous membrane covering the tiny chain of bones.

The temporary excitement which their first arrival caused subsides. The dull, stuffed feeling in your ears disappears after a few days or perhaps a week or two. You think you are as well again as ever; but if you were

to test yourself with a watch or tuning fork, you would find you had lost a couple of inches of the distance at which you could hear it. Another cold is caught a few months or years later and fresh reënforcements are added to the hostile forces at work in your drum cavity. A sharper attack of stuffiness and temporary deafness follows; and when that subsides you have again lost a few more inches of your range of hearing. And so you slip gradually down the incline toward the pit of deafness; until finally, by the fifth, tenth, or fifteenth attack, you have lost enough of the "margin" of your hearing to begin to make it difficult for you to hear ordinary conversation. Then you suddenly discover and announce to your friends that you must be growing deaf.

Then it is too late to do much more than save such hearing as you possess and stop the process from going farther.

Just avoid common colds as completely as you possibly can; attack them vigorously, with the assistance of the best expert advice that you can secure whenever they do occur. Be particularly careful that they are cleared up as promptly and as cleanly as possible, and not allowed to hang on for weeks or months at a stretch. Consult your family physician or a competent nose-and-throat doctor whenever any stuffiness in the ears or dullness of hearing lasts for more than three days, and you will escape at least two thirds of all your risks of becoming deaf, no matter to what age you may live. The main reason why deafness is so much more common in later life than it is in childhood or young life

is that there have been so many more years to catch colds in.

Almost any infection that begins in or involves the nose and throat may also climb the Eustachian tube and attack the drum. Measles and whooping-cough, for instance, quite frequently do so, and pneumonia and the more violent types of epidemic influenza less frequently but with a peculiar deadliness, producing furious earache, with almost certain perforation of the drum and great danger of spreading to the mastoid.

There is one infectious disease, however, that seems to have a special fondness for attacking the eardrum — so much so that it is probably the commonest single cause of chronic running from the ear — and that is scarlet fever; in fact, the two most important points to watch during the attack of this scourge of childhood are the ear in the first week of the fever and the kidneys in the later stages. Fortunately the same method will tend to prevent ear trouble in all these fevers — namely, thorough and careful antiseptic treatment of the nose and throat by means of sprays and washes such as are advised in the treatment of an ordinary cold, only somewhat more strongly antiseptic or germicidal. Care in this respect will reduce the risks of ear trouble, even in scarlet fever, to a minimum.

It is always well for the intelligent mother to be carefully on the lookout for earache in all the little fevers of childhood, including colds and tonsillitis, especially in children who are too young to tell or even clearly indicate with their little hands where the pain is situated. Successive attacks of loud and prolonged

crying or screaming without ascertainable cause in a baby or young child that is feverish, particularly if the little one rubs the side of its head or burrows its head deeply and restlessly into the pillow, should always rouse suspicion of earache and call for expert advice.

Though colds or sore throats will cause earache or middle-ear disease in the adult directly, in children they more commonly do so indirectly by setting up that inflamed and suppurating condition of the roof of the throat now famous as adenoids. An adenoid child, with this pile of tinder at the very mouth of his Eustachian tube ready to flare up at the slightest spark of cold or chill, lives perpetually upon the brink of deafness.

As a matter of bitter practical experience, most children with adenoids sooner or later become deaf enough to interfere with their studies and mental development; and the habit of attacks of earache after every slight cold in a child almost invariably means the presence of adenoids.

Colds upon colds thicken up the drum and stiffen its conducting chain of tiny bones just as the proverbial dropping of water wears away the stone. The best preventive of deafness is fresh air — twenty-four hours out of the twenty-four. For ninety-nine per cent of us, the statement, "no colds, no deafness," would be literally true.

Of course the more completely we can avoid colds, the better it will be, not merely for our ears but also for our joints, our hearts, our kidneys, our livers, and our nervous systems; for the conviction is steadily growing

that these puny "little foxes" in the body vineyard, these mere rats and mice in the House of Life, probably cause more Bright's disease, organic heart disease, gout, rheumatism, and neuritis than any other single influence.

Though this "counsel of perfection," of absolute avoidance, is impracticable in the present state of our intelligence and the health conscience of the community, fortunately the very same measures which reduce the risks of cold-catching to the lowest possible minimum are also those that will enable us to acquire immunity from colds, resist them vigorously when they do occur, and throw them off cleanly and promptly. So that if we live cleanly, wholesomely, happily, with a gentle current of fresh, cool air — popularly known as a draft — blowing across our faces two thirds of the time — day and night — with plenty of exercise in the open air, plenty of rich and appetizing food and plenty of sleep, we can practically snap our fingers at colds and ninety-nine per cent of their deadly consequences, including deafness.

Our noses and throats are evidently, under civilization at least, points of least resistance in the body. This is illustrated by the fact that they are not only the site of the commonest of all our diseases — colds and their relatives — but are also the port of entry for at least half, if not two thirds, of our more serious infections, such as measles, scarlet fever, smallpox, diphtheria, and so on. It is a useful and practical procedure to keep in your bathroom or your bedroom, or on a shelf of your medicine chest, some form of mild

alkaline and antiseptic nasal spray or wash. Your family physician will gladly give you a prescription for one suited to the special conditions of your nose and throat, or the "family" nose and throat. Then use the wash whenever you suspect that you have been exposed to risk of infection by a common cold — for instance, when you have been to the theatre or to church, or in a crowded, stuffy, smelly train or street car — or whenever you feel any sensation of tickling, dryness, or stuffiness in the nose and throat, and with redoubled vigor when you think you are catching cold. I know of no "stitch in time" in our hygienic economy that is more likely to "save nine" than this simple procedure.

The chief things needed in these washes are that they should be as nearly as possible of the same density — specific gravity — and temperature as the blood, and not too strongly antiseptic; for it is almost impossible to make them strong enough to kill or even seriously injure the germs in the nostrils without making them injurious to the delicate membrane of the nose. If properly adjusted to individual conditions they are perfectly harmless and have a decided effect in diminishing the probability of colds being caught, the severity of their attack if they do occur, and the likelihood of their hanging on or producing unpleasant after-effects. Then, in the event of a definite impairment of hearing which does not promptly subside within two or three days, consult your family physician or a nose-and-throat specialist. Nothing is easier than to cure deafness at this stage of the process; and even a single treatment now may be the means of

blocking the way in the direction of serious and permanent hardness of hearing.

It may perhaps excite wonder in some minds as to why that wretched little rift in the lute, that fatal leak in the side of our bark of hearing — the Eustachian tube — was introduced or permitted in our bodily makeup by Nature. In view of its dangerousness, why should we not stitch or plug it up completely in some way and thus protect the middle ear from a thousand risks? Unfortunately it is as necessary as it is dangerous. If our eardrum is to vibrate at all it must have air on both sides of it, and the pressure of the air inside or behind it must be kept equal to that on its outer surface; and this tube is simply an equalizing pipe for that purpose, through which air can be sucked into the drum cavity whenever a vacuum begins to form.

Indeed, blocking up the tube alone will cause deafness. The air in the drum cavity is quickly absorbed into the blood, producing a partial vacuum; and then the atmospheric pressure of the outside air upon the drum pushes it in, so that it can no longer vibrate; and at the same time it jams the little chain of bones together so tightly that they cannot transmit the sounds. This is one of the methods by which middle-ear deafness is produced — the tube becomes blocked by inflammation, the drum is driven in by the pressure of the outside air, and slow fibrous changes tie it down and glue the bones together — and permanently fix them so. This is why the mere driving out of a bubble of air along the Eustachian tube — as, for instance, when you blow your nose and your ear "goes pop" — will

sometimes improve your hearing when your head is stuffed up and your ears feel blocked and full.

However, every cloud has its silver lining — and deafness is no exception. In spite of the swarms upon swarms of enemies that threaten the peace of our ear-drums, and the frequency of some degree of hardness of hearing after middle life, there are two or three consoling items to be entered on the credit side of the ledger. The first of these is that, as we have already seen, all these conditions are not only preventable but in process of prevention by the spread of intelligence and the progress of sanitary science. The second is that the vast majority of cases of deafness, even after they have got a good start, can be kept from developing beyond the stage where there is still sufficient hearing left for most practical purposes. And, last and most fundamental of all, middle-ear disease, which causes nine tenths of all deafness, almost never completely destroys hearing.

This last is inherent in the nature of the affection; for, as we have seen, the middle ear consists entirely of conduction apparatus, and the real, live, essential parts of the organ of hearing — the nerve and the sound-keyboard — are absolutely untouched and as perfect as ever. So that, if we can only get sound waves to reach the internal ear by some hook or crook, it can still hear them. The easiest and, so to speak, the most open route for sound waves to reach the nerve of hearing is, of course, through the ear canal, the drum and its bones; but luckily this is not the only channel.

Just as soon as sound waves are loud enough to jar

through the bones of the head, they can reach the nerve of hearing and be heard, though the ear be completely blocked. Upon this fact depends the usefulness — unfortunately not very great — of the various trumpets, tubes, and fanshaped hearing instruments. Some of these are pressed into the ear; some rest upon the upper front teeth if these be still our own; but all such appliances help chiefly by virtue of the fact that they collect sound waves and communicate them directly to the bones of the head and through them to the nerve of hearing.

The ear trumpet assists the hearing partly by the size of its mouthpiece or bell, which collects the sound waves and somewhat magnifies them, and partly by its pressure on the ear which brings the instrument into direct contact with the bones of the head. The speaking tube is more effective yet, because the lips of the speaker are held so close to its mouthpiece that the vibrations of his voice are communicated directly to the walls of the tube and carried by them to the bones of the deaf person's head and thus to his nerve keyboard.

It is impossible to say even approximately how frequent deafness is in the community — partly for the reason we have just been considering, that so few cases ever reach the extreme or disabling stage, and partly from the fact that Nature with her wise and kindly foresight has provided us in advance with nearly three times as much hearing as we actually need for ordinary purposes. It is a matter of common observation in the consulting room, or in the clinic at the ear hospital,

when patients come in complaining that they think they are "beginnin' to get hard of hearin'," that they have usually lost from one half to two thirds of their normal hearing. They can barely count the ticking of a watch at eight or ten inches, for instance, which they should hear at forty inches.

There is this consolation, however, that, if we can succeed in improving the condition of their drums up to where they can hear the watch at fifteen inches, they have regained all the hearing they need for practical purposes and will consider themselves cured. This margin gives us a valuable means of warning in advance; and if any one over forty has the slightest doubt or suspicion about his hearing it is not a bad idea for him to test it occasionally by the simple process of trying how far away he can hear his own watch tick, which usually should be about thirty to forty inches.

If a systematic test were to be made of, say, a thousand persons of fifty years of age and upward, it would probably be found that most of them had lost some of the surplus or keener edge of their hearing; but very few of them would probably ever have recognized the fact. Those who had lost enough of their margin of hearing to make it obvious, either to themselves or to their families, that they were becoming deaf would only be a moderate-sized group; and, even of these, probably not more than one in ten would have lost enough hearing to make it a matter of grave inconvenience or even serious annoyance to them, while not more than one or two in the thousand would have become "stone" deaf. So, though the outlook for complete cure of one

who has begun to grow noticeably deaf is not encouraging, the prospects of his being spared the graver and more disabling degrees of loss of hearing are very good.

Though little need be said about the forms of deafness due to disease of the two extremes of the hearing apparatus — the external and the internal ear — yet there are a few facts of practical importance about both. First and briefest, the almost sole condition of the outer ear which seriously interferes with hearing is wax. This curious, half-oily, half-gummy substance is the natural secretion poured out by glands in the skin of the outer ear, which resemble the sweat-glands over the remainder of the body. The secretion's use is, first, to keep the skin properly lubricated, supple, and waterproof; and, second, by its gradual outward flow to carry out of the ear canal and deposit in the bell of the outer ear such dust, lint, bacteria, and even tiny insects, as may have been blown into the canal. A considerable amount of wax in the canal of the ear is absolutely necessary for its health and safety, and the main thing to remember is that the wax is to be strictly and absolutely let alone until it has flowed out into the hollow of the outer ear, where it can be wiped away with a cloth over the tip of the finger in the ordinary toilet of the face and neck.

It is not until the flow of the wax becomes checked in some way and begins to dry and pile up in large masses in the ear canal that it causes any trouble whatever with the hearing.

The two most common causes of this damming up of the wax are: first, middle-ear disease, which in some

curious way appears to alter the chemical character of the secretion of wax in the outer ear; second, meddlesome interference with the normal and necessary amount of wax in the ear under mistaken notions of cleanliness, such as endeavoring to scoop it out with the twisted-up corner of a towel, or even with one of those inventions of the Evil One, the earspoon or earpick. The homely advice of the old German proverb is thoroughly sound and reliable: "Never clean your ear with anything smaller than your elbow."

The proper method of removing wax is simplicity itself — gentle syringing with plenty of warm water through a syringe with a long and properly curved nozzle; but this should never be undertaken by any one but a physician, as the damage that may easily be done to the delicate tissues of the drum is far greater than any that will result from leaving even the largest plug of wax in place. The actual plugging effect of wax in producing deafness is very much less than was formerly supposed as, unfortunately, when the physician has syringed out every particle of wax from the ear he often finds a thickened and distorted drum behind it, which was causing two thirds of the hardness of hearing.

We may relieve our minds of one dread of the future. Not only is the nerve of hearing exceedingly well protected against disease or injury but it is astonishingly enduring and tough and fatigue-proof in its own proper business, so to speak — that of receiving and responding to the sound waves. Not even the horrible racket and cacophonous noises of modern civilization can in-

jure it in the slightest degree; and there is no danger of our being deafened, except momentarily and metaphorically, by the whole Wagnerian overture of city life, with all its accompanying clanging and shrieking, rattling and roaring, hammerings and explosions.

Legend and fiction to the contrary notwithstanding, there is no authentic instance on record of deafness produced by noise, no matter how loud or how maddeningly incessant. The only apparent exception is that the discharge of a cannon or an explosion of dynamite may rupture an eardrum; but this is simply due to the direct violence of the explosion and has nothing directly to do with the noise of it. Like other ruptures of the drum, recovery is usual; and such impairment of hearing as may result is due to the damaged condition of the drum.

The most citified civilized man, provided he has escaped middle-ear inflammation, has just as keen a sense of hearing as the freest and wildest savage, the only difference being that the civilized man does not know how to interpret every faintest whisper and sound as does the Indian hunter, for instance. Even an engineer could beat an Indian in delicacy of hearing, when listening to discover whether his engine was running properly at every point.

CHAPTER XIV

FOOT FAULTS

ONE of the best foundations for success in life is a good pair of feet. No small proportion of our efficiency and our comfort depends upon our ability to "make tracks" with agility, precision and persistence. And that ability is very closely related to the shape of the tracks that we make. Well doth the good Book admonish to take heed unto our feet, and next to taking heed of the direction in which we point them comes care of the shape in which we keep them. I said "keep" intentionally, for Nature made them right in the first place if we will only be careful not to spoil her results.

There's a tremendous lot of responsibility on feet. No matter how big and bulgy a brain a man may have, it's his poor tired feet that have to carry it around for him, and some brains I know would make any pair of feet tired — the weight of them, I mean. We hear a great deal of late years, particularly, about heart failure as a cause of breakdown, but as a matter of fact "foot failure" is far more common and wellnigh as important, though of course not so fatal or dramatic. No man is stronger than his flattest foot. Certainly two thirds of our backaches, a fair share of our headaches, a large moiety of the pains and penalties supposed to be a peculiar heritage of women, are due solely to bad

shoes and sins against our feet. We have all heard of and laughed consumedly at the imaginary individual who was so short that when he had a pain he could n't tell whether it was headache or corns, but there is many a six-footer who is in just such a predicament. The unbalance caused by badly shod or painful feet is not only fundamental but most far reaching, and myriad as are the breakdowns and cripplings in other parts of the body produced directly by it, there are many more in which it plays a weighty contributing part. Corns and bunions and flat feet are not only painful and disfiguring and disgraceful — they and their like are the real *pudenda*, parts of our bodily structure that we ought to be ashamed of, not anything created by nature — but they are also a very serious handicap upon our efficiency in every direction, mental as well as physical, and moral more so than either, reducing our H.P. at least fifteen or twenty per cent. A man with tight boots and corns may get to heaven, but it will only be because the recording angel is deaf or takes a day off from his job occasionally; while he that hath no comfort in his feet is far more essentially fit for treasons, stratagems, and spoils than the blameless man who happens to be tone deaf, in other words, "hath no music in his soul." If Cæsar really wished to have good-natured people about him he would have been far more sensible to have paid attention to the opposite pole of the body and to have picked out instead of "sleek-headed men and such as sleep o' nights," smooth-footed men whose shoes are never tight.

Misery loves company, and it may be some slight

consolation to us to know that we are not the only animal that breaks down foremost and frequently in his feet. Our friend and servant, the horse, has even more trouble with his feet than we have with ours, and for something the same reason, namely, over-specialization. For while he still has all his weight-bearing and work distributed among four feet instead of concentrated upon two, yet in the interests of speed and specialization his feet have had not merely their heels but the soles and the balls pulled up from the ground and the toes whittled off one after another on each side until finally he is reduced to supporting his entire weight upon the thickened toenails of his middle fingers. Toenails are wondrous tough, but they have their limitations; and while Equus caballus got along all right as long as he roamed at large over the plains with flying mane and crimson nostril, road trotting, and particularly street hauling, are another pair of shoes altogether. As Leech's groom expressed it many years ago, "Oh, it ain't the 'unting across the 'edges and ditches after the 'ounds that 'urts 'im, it 's the 'ammer, 'ammer, 'ammer on the 'ard 'ighroad." And it does "'urt 'im" terribly, for as any experienced horseman or veterinarian will tell you, not only is unsoundness in the feet overwhelmingly the chief cause of disability, loss of value, and aging in horses, but that all so-called broken knees, most sprung shoulders, weak backs, so-called kidney troubles and lamings of every description are due to inflammations of the hoofs. Roughly speaking, as long as a horse's feet are good, he's good.

In one of those dreadful, gasping hot spells, which we occasionally have in New York in summer, I was walking down the Sixth Avenue, when my attention was called to the frightful discomfort and distress among the poor horses by seeing one of them fall, as if he had been shot, from sunstroke. Within less than a mile I saw two other poor beasts who had just been helped to their feet after a similar experience, and happening to notice that the first one of these stood upon three feet and toed over and fidgeted upon the other one in such way as to show clearly that he was lame in it, I took pains to notice the other horses as I passed down the street whose drenched coats and drooping heads and panting nostrils showed clearly that they were in distress, and every one of them had either broken knees or stood on three feet, or fidgeted from one foot to another as if all of his feet were sore; while the second poor brute that I saw recovering from sunstroke could hardly stand on his feet after he had been helped up on to them, they were so sore and painful. If any human being wants to double his or her risk of sunstroke in hot weather, one of the surest and most effective methods of doing it is to cultivate a crop of corns and wear tight, crippling shoes.

I worked the test both ways, part of the time looking first at the nostrils and coats of the horses and then at their feet, and part of the time at their feet first and then at their nostrils and coats, and the connection never failed.

Not only did I never find a horse with lame feet who was not distressed, but I never found a horse with

perfectly sound feet who was seriously distressed, except a few who were overloaded or who had apparently been overdriven.

Nevertheless sufficient unto the animal are the feet thereof in spite of all the stresses and strains to which they are subjected even under civilization, if they are just given a fair chance to adjust themselves and a decent show to do their new work in their own way. Indeed the parallel between ourselves and our equine cousins is very much more nearly a case of horse and horse than we might at first sight suppose. A very large share of the lamings of both the human foot and the horse's hoof are due not so much to actual overwork or overstrain, as to practically one and the same cause, namely, our utter and grievous lack of horse sense in surrounding both hoof and foot with a hard, rigid band of iron in the one case and leather in the other, which absolutely prevents its expansion when weight is thrown on it. The moment you do that you might just as well have pieces of two-by-four scantling under you instead of feet. The prevention of expansion works its damage in slightly different ways in the foot and in the hoof, but the general principle is the same and the net results distressingly similar.

It may appear almost paradoxical to talk about expansion in such a hard, stonelike structure as the hoof of a horse, "but she do move just the same," "*e pur se muove*," as Galileo remarked of the world, coming up the cellar stairs from the torture chamber of the Inquisition. A horse's hoof, rigid and solid as it looks, actually does get slightly but appreciably bigger every

time he steps on it, and the prevention of this expansion, even if it be only a fraction of a fraction of an inch, by an unyielding iron shoe will make all the difference in a few weeks or months between soundness and hopeless and crippling lameness.

The most deadly damage done by the horseshoe is, however, by preventing expansion of another sort, internal expansion we might call it. The point on which a horse's weight should naturally be supported and the one which strikes the ground first when he walks or trots is not the hard, toenail-like rim of the hoof but the thick, spongy pad in the centre of the foot, half leather, half rubberlike, known as the frog. In a state of nature this thick, spongy pad projects well above, or rather, below, the hard rim of the hoof, which is simply used to push off with, which gives that beautiful cushioned deerlike gait to the bronco on the plains, or the unshod colt in the pasture.

But the moment that man permanently enslaved the horse and began to use him on rocky roads or hard pavements, one of the first things that he did, with the usual intelligence of the master and employer class in dealing with the worker, was to protect his poor, unshod feet by nailing bands of iron around their rim and providing these with calks or crossbars which lifted the softest and most defenseless-looking part of his foot, the frog, out of harm's way and prevented it from coming in contact with the ground at all. It took eight or ten centuries for them to discover that the apparently benevolent protection and assistance that they were giving to their faithful servant was really crippling him

for life, nearly as long in fact as it took human work horses to make the same discovery in regard to the benefits and benevolences conferred on them by the master class.

Directly underneath the horny projection of the frog lies a big, elastic sponge of blood vessels; whenever the natural hoof strikes the ground the weight of the body falling upon the frog squeezes out the ounce or more of blood in this sponge and drives it into every part of the foot, and when the weight is taken off by the foot being lifted from the ground the sponge refills itself by its own elasticity and is all ready for another squeeze at the next step. In other words the frog is a sort of local heart for the nutrition of the foot. What wonder then that centuries before we took any trouble to know anything about the structure of the frog we found that the last and most hopeless act in the drama of laming was what was known as contracted heels or contracted hoof, a shrinking inward of the heel or rear corners of the toenail with general atrophy of the hoof. But once this has occurred the poor beast is fit for little more than the slow torture of the peddler's cart or the swifter and far more merciful exit of hide and bone factory.

What has happened is simply that the foot, deprived of its natural rhythmic expansion, driving the blood into every remotest portion of it, and particularly around the rim of the toenail, is cut off from a fair half of its nourishment and begins to shrink and shrivel in a literal living decay. While we might perpetrate this stupid barbarity upon a horse's hoof, it would hardly seem

credible that we would be guilty of such painful stupidity towards our own feet; yet I grieve to state that I fear it would be well inside of the truth to say, that nearly fifty per cent of all living human beings and the more citified and so-called intelligent, the worse, are to-day suffering from contracted hoofs.

We don't carry the atrocity quite so far, of course, in our own case, partly because we don't make shoes of iron and can't nail them on, and partly because after all they're our own feet, and personal discomfort sets certain limits to even human vanity and stupidity. Although in the case of other people's feet, iron-bound and copper-toed clogs with wooden soles are highly recommended for wear by work people as helping them to live within their income upon the wages vouchsafed to them by various kindly and benevolent Manufacturers' Associations of England and other parts of Europe.

Incidentally it might be remarked that we have practically solved, or are solving, the problem of footwear for the horse, have in fact made a better beginning in that direction in providing ourselves with rational footwear. Many of the most valuable horses, both draft and carriage, nowadays, are no longer shod with iron or metal of any sort but with discs of compressed rawhide skillfully fastened to the hoofs without nails. The shoes wear out quicker of course than iron ones, and this was the most obstinate objection to their introduction; but the hoofs underneath them wear a great deal longer, and fortunately a good horse is worth a great many pairs of shoes, though we

don't seem to have fully discovered this saving truth in regard to the human animal. In addition to the rawhide shoe the frog, instead of being lifted as high as possible, and even pared away for fear it would touch the ground, is covered with a thick, soft pad especially prepared of elastic virgin rubber which restores in full its pumping action but protects it from bruising on stones or pavements.

Even the horse has got his gum shoes on and is able to "rubber around." As a substitute for Puss in Boots we have the Horse in Gum Shoes.

Our own ironbound footcasings cripple us more universally than the horse's do him, though in a slightly different way. Their chief damage is effected by preventing the nearly three quarters of an inch lengthways expansion and half an inch crossways expansion required by the giving of its beautiful combination of arches. This reduces at once the beautifully elastic, graceful, and enduring gait to a stiff, rigid, clumping sort of stumble, or, at best, mincing strut which makes real walking a punishment. Whenever this gait has once been struck one thing may be counted on as certain, and that is that such an individual will never willingly and consentingly walk to exceed half a mile a day, and will take most of his exercise with praiseworthy regularity running from the door to the street car and from the street car to the office elevator. If it were not for the acrobatic, strap-hanging stunts required of them in the cars and in the subways — and their corns — New Yorkers would almost forget that they had such things as feet.

This spells the decline and decay of our understandings in two different ways. First, by making all walking, beyond the merest tabbycat trottings about, out of the question, and thus weakening the tissues and arches of the feet, but even worse, the muscles of the calves, the legs, the hips and the back, indeed of the whole body, paving the way for that distressing and most crippling of foot faults, flat feet.

The second way in which shoes spell damage is exactly parallel to the case of the horse. In fact a short, tight shoe is literally as well as metaphorically "a horse on us." Nothing living under heaven can thrive unless it has plenty of exercise, from teeth and brains clear down to toenails and feet. And when your feet are put in splints or strait-jackets for ten or twelve hours every day, it is not long until they begin to lose strength and vigor from the loss of the normal pumping action of their alternate expansion and contracting, and this lowers the nutrition of all their tissues and lays the foundations of corns and bunions upon the surface under the chafing pressure of the shoe, and of various other kinds of weak and painful and swollen feet.

It also makes the circulation through them poor, so that their unfortunate possessor is perpetually suffering from cold feet, which are even worse physically than they are metaphorically, rendering them unable to resist accidental wettings and chillings from cold or snow or slush, which if they were big and elastic and hearty they would pay no attention to at all. This lays the foundation not merely for the famous

train of misfortunes, coughs, colds, and consumption, but also for congestion of the liver and stomach, and disturbances of the circulation in the joints and in the nerves, making the unfortunate cold-footer neuralgic and rheumatic and dyspeptic.

We seldom fully realize to what an enormous extent anything that interferes with the free, vigorous, and enjoyable use of our legs lowers our entire vigor and impairs the whole condition of our health. The best lung developers ever invented are the muscles of our legs, and walking is not merely our best exercise, but, broadly considered, makes up fully three quarters of our total exercise, especially among city dwellers, except where the muscles of the hands and arms are vigorously employed in manual labor. If you cut off walking, or make that disagreeable, not to say painful, you cut off at one stroke from two thirds to three fourths of our possibilities of exercise in the open air.

I happen to have had, at one time or another, for my sins, a good deal of experience in endeavoring to drive women, more particularly of the comfortably situated classes, to take even a decent apology for an adequate amount of exercise daily in the open air, and I have no hesitation in saying that three fourths of the almost insuperable difficulties encountered in such a crusade are due solely to their ridiculous and vile-fitting shoes. Part of the difficulty, of course, is due to the strait-jacket corset, and the binding, hobbling effects of the skirt, but both of these again are closely related to and dependent upon bad shoes, for the pain-

ful, practical syllogism runs steadily. Bad shoes mean no walking, which means ugly feet, and "not to put too fine a point on it," as Mr. Toots would say, unbeautiful limbs. These again mean skirts of the thickest and longest; for the chief rock of defense which has protected that relic of barbarism, the skirt, from every form of attack by reason, health, and æsthetics for centuries, and will probably continue to do so for centuries to come, is the plain, uncomplimentary, and humiliating fact that most women are ashamed of their feet and ankles because they think that they are not pretty, and candor compels me to admit that a good many of them are right.

The worst and most seriously disabling of faults which lead to foot failure is flat foot. This distressing and sadly familiar condition of affairs is pretty definitely and graphically described by the name it bears. The arches of the foot, particularly the longest one from before backward, have given way or broken down under pressure, thus depriving the gait of all elasticity and making even standing painful, partly from pressure upon the tender tissues in the instep of the foot, and partly by the grinding against one another of the bones of which the arch is composed. The acute pain which often accompanies flat foot seems to be due, in considerable measure, to the fact that the bones on which the arch of the foot is built are, like a good piece of stone masonry anywhere else, made in wedge or keystone shape with their smaller ends pointing downward, so that the

more the arch is flattened, the more tightly the upper margins of the bones are jammed against one another and against the surrounding tendons and other tissues. In this jamming both small blood vessels and sensitive nerve twigs, which under normal conditions have plenty of room to run without pressure upon them, are stretched and pinched so as to give rise to intolerable discomfort. This may occur not merely between the bones of the arch of the instep, but also between the bones of the cross arch in the sole of the foot. Curiously enough it makes little difference what shape of shoes you wear after you have actually got flat foot; it was the shoe you were wearing three months or three years before that caused the breakdown.

As has already been outlined, bad shoes cause flat foot, chiefly by making walking disagreeable, and in this way weakening the muscles, not only of the foot itself, but also the legs above it, particularly those of the calf. The exact way in which the arch is let down is interesting and somewhat unexpected. It simply depends upon the anatomical fact, that while the arch of the foot is composed of a series of wedge-shaped bones carefully and neatly articulated together, these alone by their shape and bulk would never support the weight of the body for a moment, as is gruesomely illustrated by the fact that if a dead man be placed on his feet his arches flatten down at once.

Such a gruesome probability as this may even have its uses, for there is an ancient historical legend abroad, widely circulated, and, as historical legends go, au-

thentic, — quite, if not more, for instance, than some of the myths about the Mayflower and her passengers — to the effect that various of the races of western Europe, notably the Picts and Scots of the North, had such enormous feet that they would remain standing upright even after they were dead. So that after the battle it was customary for the Roman victors to go around and give a vigorous push to all the enemy that remained standing on the field of battle to see whether they would fall or not. If they fell over they were presumed to be dead, and if they remained standing they were taken prisoners.

The thing then which maintains the arch of the foot as an arch in the living body, is the constant pull and support of the muscles, muscles not in the foot itself, which contains comparatively little muscular structure, but in the bulge of the calf of the leg above, from which origin tendons, or ropes of animal whipcord, run down into the foot, and running from before backward, from heel to toe, string up the longitudinal arch just as a bow-string strings a bow. While others of them, running down the inner side of the leg, turn under the arch of the instep and run completely across it to the outer side of the foot to attach to a bone near the base of the little toe, from which anchorage they guy or buoy up the crossways arch of the foot continually. Cut or weaken the muscles of the calf and down go both the arches of the foot, just as a bow relaxes when you cut its string. Indeed, extraordinary and sickeningly gruesome as it may sound to-day, the ancient Romans, with that fiendishly accurate know-

ledge of anatomy possessed by the wolf and the weasel, were actually in the habit of producing an artificial flat foot in their prisoners of war by the simple and effective method of a slash across the back of the calf as they overtook each unfortunate fleeing from the field of battle, thus ham-stringing him. In this pleasing manner they both effectually prevented his escape and made him a sure and safe slave or house-servant.

One significant and hopeful fact there is about flat foot, nobody is born with it and children under ten or twelve comparatively rarely have it, unless they are sickly or half-starved. It is one of those accomplishments which we acquire ourselves or confer upon our children. And as we literally make ourselves or our children flat-footed, it is obvious that we can prevent the condition by the exercise of a little foresight and common sense. All we need to do is to let children follow their unspoiled instincts, and run and dance and skip and play in the open air as much as they want to, and they will never get flat feet. Broadly considered, flat feet never grow outdoors.

There are three main causes which produce flat foot in children or young adults. The first is tight shoes, the second is the schoolroom, and the third puritanic notions about plain food being good for children. It is doubtful which is the commonest product of our present antediluvian system of education, dull brains or flat feet. We concentrate most of our effort in school upon the upper pole of the body, and this is fortunate because the brain is the toughest part of the child's body and a good deal of the pounding and overloading

directed to it bounces off as it were and hits the feet.

Many an unfortunate youngster who has been stood up two hundred days each year under our educational pile-driver comes out of it in much the same condition as did the Alabama darky who was seen limping painfully along the street one day. When asked by a sympathizing friend what was the matter with him, he indignantly explained, "That thar Rastus Brown am the stupidest and most disconsiderate nigger I most neber saw. Him and me had a scrap 'bout somepin' yesterday and he up and lambasted me wid a piece of scantlin' right over the top of the head, when I was standin' on a cement sidewalk, and most busted my po'h feet to pieces."

The confinement and bad air of the schoolroom lower the tone of the entire body and weaken all the muscles, and the feet catch the strain.

Next after confinement in the schoolroom, the most fruitful cause of flat feet is that group of occupations which involve a good deal of confinement indoors, and much standing or moving slowly about without much opportunity for active walking, particularly if these be combined with bad air and poor food. The occupation in which all these evil factors meet their highest perfection and their most exquisitely effective combination furnishes the largest number of flat feet, and that is domestic service.

Close after them, and not at all a bad second, come housewives who have to do their own work, especially where that work is excessive in amount, and the pro-

blem of making ends meet is solved by giving the best of the food to the husband and children, going half fed themselves; which pleasing conditions obtain in about forty per cent of the households of this favorite land.

Next in this parade of pedal disaster come shopgirls and factory workers who have to stand the greater part of the time or do their work on their feet. Then come clerks and bookkeepers, who do their work standing at the old-fashioned high desks, nurses in hospitals, and attendants of all sorts in hospitals, public buildings, etc.

Almost the only outdoor classes who suffer markedly from flat foot are policemen, letter-carriers, and soldiers. So serious and annoying a difficulty is this in policemen, that they have a special and rather graphic name of their own for it, namely, "cheese feet," by which is meant that the flattened and unelastic feet bump along and strike the ground as flatly as a pair of cheeses would.

The reason why such a surprising amount of this defect of weaklings occurs among these classes, who are always picked men, are far above the average physique, and usually in good vigorous condition, is that their duties involve such an amount of foolish and abnormal standing or strutting about in constrained attitudes, in the case of policemen and soldiers, and in the case of the letter-carriers staggering along under such heavy burdens of mail awkwardly flung on one shoulder.

In fact, we cannot too clearly bear in mind that man is not yet fully a biped, that is to say only for walking purposes; for standing purposes he is a triped and will

probably always remain so. A man can walk all day upon two legs without injuring them, but he cannot stand perfectly still on two feet for a single quarter of an hour without a crippling degree of fatigue and serious injury to his feet. To sufferers from flat feet the most important piece of advice would be, "NEVER STAND." If you can't walk, sit.

Indeed, even when walking, a "third leg" in the shape of a stick or staff is most helpful and highly advisable. And one of the most striking and instinctively sensible traits of the outdoor worker, particularly the countryman, is the promptness and certainty with which the moment he ceases working or walking he either sits down upon some convenient stump or rail-fence or log, or proceeds to prop himself by leaning upon his fork or hoe. We have heard the story of the farmer who had a hired man so intolerably lazy that he was obliged to sharpen up all the stumps on his farm to a point to keep him from sitting down two thirds of the time. That hired man was not such a fool as he looked; he certainly knew what was good for his poor feet.

For the prevention of flat foot, employers of laborers ought to be compelled, either by the pressure of indignant public opinion or by law, to provide plenty of chairs and stools for their employees to sit down upon at frequent intervals, and also to arrange to allow them to do as much of the work as possible sitting. In domestic service and in housework also, every room, and particularly the kitchens and washrooms, ought to be provided with plenty of chairs, and especially with one or more light high stools which can be easily

moved with one hand, and by the use of which a great deal of work, such as dish-washing, pie- and bread-making, cleaning vegetables, and preparing food, which is often done standing, could be done sitting.

Nowhere else in the world could the doctrine of the cutting out of waste motion be more profitably applied than in the kitchen. Work should be carefully planned in advance so that everything required for the job should be got together at one place before the work is begun, and combination cupboards or kitchen cabinets arranged, which would contain all the accessories required for cooking operations within easy reach from the chair or stool placed at the table in front of it. The housewife ought to chase her brains about more and her feet less.

Explorers report that there are certain tribes of Central African savages who march about through the forest carrying light one-legged stools permanently strapped to their persons. Grotesque as it may sound, some such habit as this would save an enormous amount of flat foot and tired backs.

There should also be a much more abundant provision in the way of seats along our parks and boulevards, and at every convenient angle, corner, and open space of all of our busiest streets. The famous Parisian boulevard habit of making streets and sidewalks wide enough so that rows of chairs, with or without tables, and seductive glasses of red and green liquids, can be arranged along them, is a most admirable one from a sanitary point of view and would greatly promote the

outdoor life and the health and enjoyment of our people if it were extensively imported to this country.

Next in importance and helpfulness would come a law shortening and fixing the hours of labor for both housekeepers, domestic servants, salesgirls, and clerks, so that they should be able to get at least two hours a day exercise in the open air, and at the same time their wages should be raised, so that they could give themselves an adequate amount of real food, well cooked and fit for human beings instead of for work cattle or, in case of too many domestic servants, more accurately, for pigs. Such a law would greatly diminish the amount of flat foot and all sorts of disabilities and diseases, and greatly increase the efficiency of those concerned; they would do more work in their shortened hours than they did in their day-long grind, and give better returns on their higher wages than on their old starvation ones. At least this has been the invariable result of the experiment wherever any one has had the intelligence, the nerve, and the humanity to try it.

No matter what you may be discussing in the way of foot faults, you inevitably get back to tight shoes sooner or later. They are, as we have seen, a potent, predisposing cause of flat foot by making walking painful, while of all other common foot faults they are literally the first, last, all the time, and only important cause. Corns, for instance, that commonest, most grotesque, and most disgraceful of foot faults, are due to just exactly one thing and one only, and that is pinching by a tight shoe. Really the poor corns themselves are not to blame in the least. In-

deed, they are trying to protect the softer tissues beneath them from the jostling and poundings of that ruffian boor, the shoe. At bottom they are nothing more than small localized growths of thickened skin or callus, formed under pressure to protect the nerves and vessels, just as the soles of the feet and the palms of the hand thicken up and become horny under pressure and friction. If the tool worker or farmer could n't grow healthy corns in the palms of his hands, and we all did not have flat natural corns upon our heels and the balls of our toes, we should find both walking and work so uncomfortable that they would be practically impossible. Corns are literally good men gone wrong, and where they make trouble for us is, after they have thickened up as much as they healthfully can, and the pressure instead of letting up still continues, they begin to overgrow in the form of a sort of wedge or blunt cone right down into the tender tissues which they originally set out to protect.

There are lots of silly things that can be done to mitigate corns, such as scraping, paring, soaking in hot water, surrounding with ring plasters; but there is only one thing that can be done to cure them, and that is all that is necessary, — take off the pressure of the shoe at that point. No pinch, no corns. Of course, a corn which you have been nursing and developing at great pains and expense for ten or fifteen years, scraping it down carefully every night and chafing it up again in the daytime, is not going to wither and fall off in a single night like Jonah's gourd, the moment that you give your feet their freedom.

Though after centuries of experiment, we are driven to the conclusion that "there 's nothing like leather" for all-round wear, it is well to utilize in their appropriate place and season, especially for the upper parts of the shoe, softer, cooler, and more porous fabrics such as buckskin, linen, woolen cloth, or felt; also, wherever the nature of our occupation will admit, to plan to take off our shoes in the house, shop, or office, and wear light, comfortable, thick-soled, and broad-heeled slippers. The slipper habit ought to be much broadened and extended, and our silly conventions as to the impropriety or even indecency of wearing slippers ought to be abolished upon every and any sort of occasion indoors, and on fine weather even in the street.

Broadly speaking, wherever and whenever slippers can be worn without undue risk of getting the feet chilled or wet and without danger of getting dust, dirt, gravel, or thorns into your feet, they should be worn. Most women, for instance, should wear slippers at least two thirds of the time, whenever they are indoors or in their own homes or in their shops, factories, or other places of work. And if most men in in-door or sedentary occupations would have the courage to do the same thing, it would greatly improve both the comfort of their feet and their own efficiency. It is a difficult matter always to get in a shoe for outdoor wear a reasonable degree of water-proofness and protective toughness, combined with proper elasticity and sufficient porousness to allow the feet to breathe freely. Especially, when there is added the requirement that the shoe shall have a sufficiently close sur-

face to be capable of taking a polish, which means that almost every natural pore in it is blocked up and then varnished over. Shoes for country or working wear, or for tramping, hunting, and outdoor sports, where the neat, trim appearance and polished surface are not essential, can be made self-ventilating and comfortable. But for city wear, probably the best compromise, with the sinful conditions in which we find ourselves, that can be made, is to wear a sensibly shaped and well-fitting shoe of polished leather down to our place of business and there to exchange it for a comfortable well-fitting thick-soled slipper. The ideal arrangement, of course, is to wear shoes of such size, shape, and porousness that you are ready just as you stand to start off to do eight miles heel and toe at any time without a moment's preparation and come in without either sore toes or blistered heels. But this in the present state of human nature is a counsel of protection and few men have the courage of their convictions, to a sufficiently high degree, to wear shoes that are really big enough for them and that actually and faithfully represent the shape of their feet.

The problem of socks and stockings is really too deadly and puzzling for a mere man to tackle; only one or two broad and vague general principles can be laid down. First of all, darning is n't worth a darn. The only time in which it could be done to advantage was when socks were woolly, fuzzy things from a quarter to a half an inch thick. Second, don't wear coarse, hard fabrics, whether of cotton, linen, or wool, next to the feet; above all a sock should be soft and smooth. Third,

the best way to thicken up socks for winter wear is to put on one or even two extra pairs. There is no more merit in wool here than anywhere else on the surface of the body, for it is hot, scratchy, and sweaty. Fourth, holes in socks, — too big ones, that is, — when the edges begin to roll over and lump up, probably cause almost as many blisters and chafes as do tight shoes. Buy inexpensive socks of any kind of material that is soft and looks pretty and throw them away as soon as they begin to wear out. You can't get anybody to darn them for you, anyway, whether married or single, in this twentieth century, and if you could, the darns would do your feet almost as much harm as the holes. Darn socks anyhow, they are a perpetual nuisance and you never know when you have got them right! This phase of the shoe problem I give up.

CHAPTER XV

OUR FOOT ELECTRODES: THUNDERBOLTS THAT STRIKE US THROUGH OUR FEET

WE usually think of our heads as especially exposed to the thunderbolts of Jove, but as a matter of fact, they strike us more frequently through our feet. Not only in the sense that a stroke of lightning is quite frequently upward, from the earth to the clouds, instead of downward, but also that of all the disasters and malicious animal magnetisms, embodied or disembodied, actual or astral, which strike our mortal frame, more gain access to our systems through our foot electrodes as they come in contact with the earth than by any other path except our noses and mouths.

All the dangers that menace us from above, put together, — thunderbolts, meteors, cloudbursts, falling trees, toppling chimneys, and collapsing roofs, — though vastly more dramatic and vividly dreaded, do not inflict one tenth, nay one one hundredth, of the actual damages upon humanity that spring from two such trivial and even ludicrous mishaps as stubbed toes and galled heels. In the picturesque metaphor of the Garden of Eden, one of the most effective methods of attack of the Serpent of disease upon the Seed of the Woman has been through all the centuries by bruising his heel; and it was a curiously graphic and unin-

tentionally accurate folk legend which made the heel of Achilles his vulnerable point.

Possibly also the glass slippers of Cinderella were intended by the far-seeing wisdom of the Fairy Godmother as insulators against the danger of upward lightning stroke, though they do not seem to have protected her for a moment from an acute attack of King's Sonstroke.

One of the most interesting features of the advance of science is the unexpected way in which it often justifies and explains our instinctive wisdom. Ever since we began to plume ourselves on our first pretensions toward civilization, we have obstinately insisted not only upon wearing shoes in spite of the way in which they punished us, but also in looking down upon and despising all those classes or races who did not. "Barefoot" is a term of reproach and contempt in almost every language and every age, and to appear in public with naked feet is looked upon as the last humiliation and gravest offense against that code of minor morals which we call etiquette or convention. Yet there are few prettier things on earth than a beautiful foot, and artists, reformers, and health preachers have lifted up their voices in unison to declare that the only natural and really healthy foot is the bare foot. For once, in the whole history of the universe, Mrs. Grundy was partially right, though of course it was quite unintentional on her part, and she had n't the least idea of the reason why. Her decision was based upon pure instinct as defined in that cynical dialogue between a French father and his son: "What is

reason, father?" "Reason, my son, is that faculty which tells a man whether he is right or not." "And what is instinct?" "Instinct, my boy, is that faculty which tells a woman that she is right, whether she is or not."

The taboo upon shoelessness appears to have been based upon the crude and highly illogical syllogism, successful people wear shoes, therefore it is a crime to go barefoot. The birth of the shoe for special occasions and occasional wear must have occurred very early indeed in human history, for although we use the term barefoot as one of the almost instinctive accompaniments of the word savage, as a matter of fact there are comparatively few tribes, save in the very lowest levels of savagery, which do not possess some form of sandal, shoe, patten, sock, or moccasin of buckskin which they tie on and wear upon certain occasions or for special purposes, even though they go barefoot most of the time.

The beginnings of the shoe habit are easily explainable on grounds of comfort and increased efficiency. However passable a protection to our feet might have been afforded by the native leather of our thickened and calloused soles when engaged in such desultory pursuits as hunting and foraging for fruits, shrubs, and roots, there are two things you cannot carry on to any satisfaction and success without shoes,— war and work. The soldier cannot waste time or take his eye off the enemy long enough to pick his footing, so that the boots and spurs of the knight and the sabots of the villein alike became the symbols of their trade,

and the badges of the rank of one, and the degradation of the other.

The shoe is a work tool not merely in man but also in such animals as have risen (?) to the dignity of labor. Horses and oxen are, of course, habitually shod, and the romantically famous sledge dogs of the Arctic, Malamoot or Husky, travel much farther and safer if shod with carefully fitted skin boots, especially when there is a crust. In the case of all these beasts of burden from human to canine, the shoeing has often been so badly done as to bring severe penalties with it; but after all, the balance of the problem, to shoe or not to shoe, hangs pretty much as did the woman question in patrician Rome. Family life had come to such a pass on account of the encroachment of wives upon masculine prerogatives and their perpetual and increasing demands for greater liberties and wider privileges, that a meeting of alarmed husbands was called to discuss the situation. After several hotheads had spoken on the subject of immediate divorce and the boycott of marriage in the future, one, Caius Metellus, arose and bluntly reminded them that, although this fiery talk about freedom and separation sounded very well, the actual crux and impasse of the situation was, "That we cannot live comfortably with our wives, nor at all without them."

Shoes are like matrimony, they require a good deal of intelligence and forbearance on both sides to keep life tolerable.

But the utility of shoes, and such comfort as they may give, even together with their ornamental and

ceremonial aspects, are quite inadequate to account for the extraordinary universality and constancy of their wear, in season and out of season, indoors or outdoors, rain or shine, and the iron-handed tyranny with which such wearing is enforced under direst penalties of lack of social standing and respect of one's fellows if the custom be defied.

It is just of recent years that we have discovered a factor which throws a flood of light upon the rigorousness of this taboo of unshodness, and which, though entirely unconscious, must have exercised a profound influence in placing the stamp of disgrace and discredit upon bare feet, entirely apart from the indication of poverty involved. This is the surprising degree and frequency with which the germs of infectious disease and dangerous parasitic worms and insects of various sorts enter the body through the skin of the feet.

We are very far from realizing to what an extraordinary degree our safety and our health depend upon literally "keeping a whole skin." Nearly one fourth of our deadliest diseases are now known to enter the body through punctures and scratches in the skin, especially those made by the bites of insects. And we are gradually being driven to the most unexpected conclusion that the one single area through which the largest number and greatest variety of these infections enter, is the skin of our feet. If we wanted to make a pathological paraphrase of the famous line, "My mind to me a kingdom is," it would run, "My skin to me a rampart is." One of our pathologists has

actually laid down the dictum that there are two great classes of infectious diseases, those transmitted directly by man, and those transmitted by insects.

The reason why our feet are so frequently the port of entry of disease is twofold: first, that they are so readily scratched or bruised or punctured by flints and thorns and splinters; second, that those punctures and scratches are perpetually in contact with the ground where all our bacteria, disease germs, and parasites live. Whatever animals, birds, or human beings our disease germs now inhabit, they originally sprang from the soil and ultimately return thereunto, and most of them are capable of living for considerable periods, if not indefinitely, in the earth, especially if this be moist and warm. "Dust thou art, to dust returnest" applies not only to man, but also to most of the bugs that inhabit him. Here are a few of them which literally swarm in the soil of the cities and densely populated regions: the tetanus or lock-jaw bacillus, the bacilli of typhoid, of tuberculosis, of surgical fever, or blood-poisoning; in warm temperate climates the bacillus of the plague or Black Death, of cholera, and the now famous Necator Americana, which, being translated, means, The American Murderer, or the Hookworm. We think little or nothing of getting mud or dirt into a scratch on the foot, and indeed in northern and north temperate zones no injurious results may follow eight times out of ten, but on the other hand it is not too much to say were it not for this trivial accident there would be no hookworm, less than a fourth as much tetanus, one third less Black Death, and at least a

tenth less of crippling rheumatism of the feet and legs. Leather is one of the greatest antiseptics ever invented, and the shoe one of the most effective preventers of disease of any art, tool, or garment invented by man, save the use of fire upon his food.

Take the case of the hookworm for instance. One would naturally and instinctively expect that a parasite which earns its living and bleeds its unsuspecting host at one and the same time, hooking itself on to the lining of his intestine just below the stomach by a ring of grappling hooks around its mouth which gives it its significant name, would certainly be carried into the body through the mouth upon infected food, drink, or fingers. Indeed, this method of infection was taken for granted at first, and the food of hookworm subjects rigorously examined for traces of eggs or larvæ of the worm until it was shown that not only no contamination of food could be proved but also, incredible as it may sound, eggs could be and were swallowed by volunteer physicians and medical students without the slightest infection by hookworm occurring. The eggs, in fact, were either digested in the stomach, or passed through the body unchanged, without developing either into larvæ or mature worms.

It was quickly found that the only place where the eggs of the worm, which pass in thousands from the body of a victim, would develop into the next, or larval stage, was in moist warm soil, particularly if this latter contained a good supply of fertilizer. Then it was found that if a little mud containing these larvæ was smeared upon the skin of the hand, for instance, the infant

wormlets would instantly proceed to burrow into the skin, producing an intolerable itching in the process. Thereafter the progress of the parasite was traced through series of animals and put together link by link, until the entire astounding March of the Hookworm was laid bare. He bores his way through the skin and keeps on boring until he breaks into a capillary or small vein. Along this he is swept by the blood current to the heart, and from there pumped through the circulation to the lungs. In the spongy swamp of tiny blood-vessels in the lung he wakes up from his trance and proceeds to bore his way out of the blood-vessels again through the wall, just as he entered them, until he strikes air this time instead of water, and emerges into one of the small bronchial tubes. Up this he slowly crawls, relentless as fate, having now attained his full growth, and being about three quarters of an inch long, until he reaches first the windpipe, then the top of the larynx in the throat, from which he tumbles triumphantly into the gullet, is swallowed into the stomach, passed on into the intestine, and there anchors himself for life to suck blood through one end of him and pour eggs into the intestine from the other until death doth him part.

But where does he get the chance to penetrate the skin of the body under the sheltering cover of a coat of mud? Naturally most promptly and readily on the feet; and here the last link in the chain was forged and a puzzling question solved at the same time, namely, What was the origin and causation of an exceedingly common and troublesome itchy inflammation of the skin of the feet and ankles, well known all over the

Southern States and wherever hookworm is found, under the names of Ground Itch, Toe Itch, Dew Itch, or simply Ivy Poisoning of the foot? Every one of these torturing rashes which kept the luckless small boy awake and scratching half the night long, indeed howling with the intensity of his discomfort, was found to be nothing more than the bonfire and display of fireworks lit up by the hookworm to celebrate his triumphant entrance into the body of another victim. The whole vicious circle and round dance of death from stomach to soil, from soil through the webs of the toes, from toes to heart, from heart to lungs, from lungs up the windpipe into the gullet, and from gullet to intestines, sounds as grotesque and incredible as a tale from the Arabian Nights. But it is a most painfully sober and scientific fact, and a sixteenth of an inch of shoe leather breaks the circle and stops the Dance of Death at once and forever.

This risk from going barefoot extends over nearly half the geographical area of these United States, not to mention our tropical possessions, and how far it is from being an imaginary danger or theoretical risk, may be gathered from the appalling pyramid of results of examinations of successive groups of the population which has steadily been piling up for some four years past; beginning with classes of medical students, who offered themselves for examination, then extending to large groups of college and high-school students all over the infected area, then to militia in camp in the various state musters, then to children in small town and country schools, with the staggering result that

never were less than fifteen per cent of the young people examined found to be harboring hookworms as non-paying guests in their alimentary canals, while from that the percentage steadily mounted, ranging from fifteen to forty in college students, from twenty-five to sixty in militiamen, and from twenty to eighty in school children. The proof, of course, was simplicity and in-escapableness in itself, namely, the discovery with the microscope of hookworm eggs in the discharges from the bowels.

It should be made a misdemeanor by law for a parent or guardian to allow any child living south of a line drawn about the level of Baltimore clear across the United States, to go barefoot in the open country in summertime.

And indeed, while I am most reluctant to lay profane and destroying hands upon such beautiful idyls and charming memories of the past as centre around "the barefoot boy with coat of tan," or to rob the rising generation of such keenly remembered delights as the cool, soft feel of the dewy grass under your emancipated feet, and the delicious quiver with which the soft mud would squiggle up between your toes after a rain, yet a sense of duty and truthfulness compels me to the bleak and joy-destroying statement that the advantages and joys of going barefoot in summertime, even in northern climates, are at least two fold overbalanced by the risks and discomforts involved. Why even when we were boys we expected to have either a "stun-bruise" or a sore heel or a barked toe or a festering stab or scratch from a thorn or splinter, to say nothing of buried briar

thorns and thistle stickers and bee stings on one or other foot all the time. And since I have had the opportunity to observe this darling practice from the cold and unsympathetic point of view of the "beastly grown-up," both as family physician and paterfamilias, it has been borne in upon me very strongly and painfully that scarcely a summer passes over the head, or more accurately, under the feet, of the barefoot boy, without the development of half a dozen nasty local sores, and usually of one or more general, and sometimes dangerous, blood poisonings.

Unfortunately the places where they could run barefoot with least risk, the city pavements and streets, which, with their waterproof surfaces and frequent cleanings are now among the cleanest patches of "ground" upon earth, do not invite in the least bare soles and tender toes by their hard and stony surfaces, and equally unfortunately the regions which most invite the toes of youth out of their leather chrysalis cases, — gardens and barnyards and cultivated fields, — are precisely the places where the deadliest of all the earth germs, the tetanus bacillus, is most likely to lurk. It is true that he causes only a few thousand deaths each year, but it is hardly worth while letting your child run the risk of being one of those few thousands, for of all the painful and distressing methods of shuffling off this mortal coil, death in lockjaw convulsions is one of the worst.

These tetanus bacilli get into the earth, of course, from the intestines of their ordinary host, the horse, through the standard use of horse manure as a fertil-

izer, and even if these should be absent there are a score of other species of bacteria from the intestines of the cow, the pig, the dog, and the chicken which swarm in well-manured soil, and of course the richer and more highly fertilized the soil the more abundant will be its crop of germs. If your child is well shod and its hands kept fairly free from cuts and scratches, it can play in even the most lockjaw and colon-bacillus infested soils with "perfect impurity" as Mrs. Partington used to say.

But what advantage does it gain from going barefoot which in any way offsets or counterbalances even this remote possibility of lockjaw or other serious infection, the strong probability of some form of blood poisoning, and the absolute certainty of ulcers and sores from festering cuts in which the living filths of the soil grow and flourish? Frankly, I know of none except the pleasure of feeling the soft earth and the cool grass under foot, and a sense of freedom in your liberated toes. But does n't it help your feet to gain their natural shape and vigor and escape from the crippling and deforming effects of shoes? For every relief which it offers in this respect it exposes the feet to at least ten new dangers. I am as keenly aware as most men of the absurdities and evils of shoe wearing, particularly of certain fashionable shapes, but as Sainte-Beuve remarked, "Il ne faut pas calomnier même l'Inquisition" ("It is not necessary to slander even the Inquisition"), and there is no doubt that a great deal of unmerited abuse has been heaped upon our valuable servant, but dangerous master, the shoe.

For instance, it is customary to declare that the shortened and often distorted form of the little and next to the little, or fourth and fifth toes, is entirely due to crowding the foot into a narrow and pointed-toed shoe, in the hope of endowing a shapeless pedal extremity with artistic merit. Also that the huge and buniony bump at the base of the great toe is due to a similar distorting pressure by pointed-toed shoes crowding the great toe outward and toward the other toes in the attempt to narrow the paddle-shaped front of our hind paw. These accusations sounded perfectly plausible and convincing so long as we confined ourselves to a study of civilized feet, which had always worn shoe leather. But the moment we went further afield it did n't take us long to discover that while tight shoes have undoubtedly aggravated both of these deformities, they most certainly did not cause them, because both are to be found blossoming in full perfection in savages who have never worn shoes, or in civilized races who habitually go barefoot. Some of the worst and most disfiguring cases that I have ever seen, both of "bumpy" and bent-out great toes, and short and crooked little toes, have been in savages who never wore a shoe in their lives, save an occasional moccasin or sandal, or in European peasants who never wore theirs save on market day or Sunday.

In fact, the dwindling of the toes on the outer side of the foot and the overgrowth of the toe on the inner side, are simply part of the great general tendency all through the animal kingdom to get rid of one or more of their original group of five toes and to concentrate

and enlarge the remaining one or two, whenever these are used solely for purposes of support and locomotion, and not for digging, climbing, or scratching. The dog, for instance, has only four in front and three behind, the tapir, three, the cow and the sheep, two, and the horse, finally, one. The process, in fact, of shrinking of the small toes and the enlargement and turning out of the large toe, must have begun at least two hundred thousand years ago, and as we have abundant evidence, was in full swing in the Cave Men on the edge of the receding glacial ice sheet.

If any one has any doubt in his mind as to how modern a disease shortened and crooked little toes are, he can resolve it very quickly by paying a visit to any art museum or gallery, where there is a good collection of copies of those wonders of the world, the classic marbles and sculptures of Greece. There he will quickly discover on even those ideals of physical perfection, such as have never been excelled or indeed equaled, little toes so short as to look like hazelnuts stuck on the side of the foot, second toes crooked and kinked upon themselves in the deformity known as "hammer toes," and great toes swollen at the base and twisted so far outward that a line drawn through their centre, instead of running back to the centre of the heel, runs two inches clear of the heel altogether and strikes somewhere near the centre of gravity of the other foot. Yet these superb creatures had never worn anything but sandals, consisting of merely a sole held on by thongs and straps. The outer toes of the foot have shortened and atrophied, and the inner, or greater, turned out-

ward, both for the same purpose, namely, simply to allow the foot to roll over easily in walking or running so that we may push off from the outer or inner border of it according as we toe in or toe out. Ever since we began to dissect the human body we have known that the fifth or little toe has shrunk so much that it consists frequently, indeed usually, of only two bones or joints, instead of three as do its neighbors.

Indeed, much and justly as we may blame and denounce certain absurdities in our civilized shoes, we have only to glance at the feet of a group of savages or European peasants to see at once that they have saved us at least from twice as many deformities as they have inflicted upon us. A more distressing collection of bumps, swellings, deformities, and distortions, splay feet, scars and blemishes, deformed nails, and feet like the flippers of the seal, could hardly be made anywhere in civilization among the highest-heeled and narrowest-toed shoe wearers, than can be rounded up in a couple of hours in any Indian camp or peasant gathering that does not demand the donning of shoes as a matter of etiquette.

When it comes to protection from the diseases and infections that may enter through cuts and scratches on the feet, we are instantly confronted with the fact that the shoeless savage or barbarian of the tropics or sub-tropics, the world over, has anywhere from a dozen to a score of diseases, some of them exceedingly serious, which the nations that habitually and constantly wear shoes, know nothing of. Hookworm, for instance, instead of being in any way peculiar to the southern

half of North America where we have been unfortunate enough to bump into it personally, is one of the great world infections and extends in an almost unbroken belt completely round the circumference of the globe at its broadest and most densely populated part, namely from about thirty-five degrees above the equator to about thirty-five degrees below. It rages all through Central Africa; indeed our American form was unquestionably imported into this country in the bodies of African slaves, thus wreaking a most disastrous and poetic vengeance upon their oppressors, for our American worm has now been shown to be identical with the African species. Another closely related species scourges the Mediterranean basin, southern Europe as well as northern Africa, and still another devastates India, southern China, the Malay Peninsula, and the East Indies. Altogether this amazingly insignificant little pest, for all the world like half an inch of wet cotton thread, causes tens of thousands of deaths, and lowers the working efficiency of the survivors from fifteen to fifty per cent. Just to wipe him out alone would increase the productive efficiency, the potential H. P. of mankind, at least twenty-five per cent. And he can be "shooed" out of existence, even though his twin pest, the domestic fly, cannot.

The next great infection the shoeless races are unprotected against is that fearful plague, the Black Death, or Bubonic Plague. It is too long a story to go into detail; suffice it to say in brief that when the bacillus pestis has killed its human victim, as it does about nine times out of ten that it attacks him, it must undergo a

sort of transmigration through first the body of the human flea, then the rat, then the rat flea, and by the bite of the last insect the human victim again. In all these stages it swarms in and infests the soil, and whether it be that the flea, living like all other fleas chiefly in the dust and in the dirt, bites the naked foot or ankle more readily than any other part of the body, or whether it be that the bacilli can find their way directly from the soil into the body of a new victim with wounds or scratches on his feet, certain it is that a very large share of the victims of plague are infected through their feet and legs. Indeed, it is this port of entry that has given the disease its name, bubonic, from the fact that the germs entering the body through the skin of the feet and legs are carried through the lymphatics into the great chain of glands in the groin, where they are arrested and give rise to the hot, purple, angry swelling known as bubo, and which is the first recognized and characteristic sign of infection. A similar bubo forming in the armpit comes from the penetration of the poison through bites or scratches on the hands and arms.

Whatever may be the exact method of penetration into the system, it is absolutely certain that the disease seldom, or never, attacks the shoe wearer, — those who constantly wear shoes. Time and again native regiments employed in the fearful outbreaks in India (the last of which, closing less than five years ago, struck out of existence nearly thirty millions of people inside of ten years, without so much as causing a ripple on this side of the Atlantic), in cleaning up the plague-infected

quarters, were literally up to their ankles in infected filth, but never developed the disease as long as they continued to wear their shoes. If, with Oriental economy, they stripped off their beautiful and expensive shoes, and went at the job barefoot, there was certain to be a considerable sprinkling of plague cases among them. So that the shoe, bad as it often is, is far the less of two evils.

CHAPTER XVI

THE LESSER PERILS OF COUNTRY LIFE: SNAKES IN THE VACATION EDEN

IT is trifles that wreck philosophies, and pin-pricks that murder happiness. Ever since literature began, poets have sung of the joys and beauties of country life, and philosophers have expatiated upon its dignity and peaceful calm. But these, for the average, matter-of-fact man, are almost overbalanced by such trifles as cold in winter, mud in spring, dust, heat, and flies in summer.

Man was born in a garden, it is true, but he has been doing his best to get away from it ever since; and among the "angels with the flaming sword" that have driven him out of the rural Eden, not the least potent have been those tiny hosts that bite and buzz and sting. The Bard of Avon, in his matchless carol, "Under the Greenwood Tree," rashly declares:

> "Here shall we see
> No enemy
> But winter and rough weather";

but he totally forgets to mention the most prominent inhabitants of the mossy shades during any season of the year when it is possible to

> "Tune one's merry note
> Unto the sweet bird's throat."

I mean mosquitoes, horse-flies, midgets, ants, and hairy caterpillars. But then, poets are always so absent-minded — or perhaps even Shakespeare did n't know any good rhyme for "caterpillar."

In like high rhapsody, Andrew Marvell, in the delicious solitude of his orchard, can sing —

> "My mind from pleasures less,
> Withdraws into its happiness,
> Annihilating all that 's made
> To a green thought in a green shade."

Evidently there were no gnats or gad-flies in that orchard, or even quaint old Andrew would have found one part of "all that's made" which declined to be "annihilated to a green thought" by any such poetic processes.

I have always felt profoundly skeptical, too, about the truth of the story that Sir Isaac Newton thought out the whole theory of gravitation under an apple-tree, after an apple had fallen on his head. If he had sat still for any length of time under an apple-tree, a thought-dome as large as his must have collected at least four caterpillars, three spiders, a beetle, and a couple of dozen flies, any one of which would have thrown the most powerful train of thought off its track.

Some cynic has declared that one reason why people are crowding into the city is that it is the only place where one can live the outdoor life with any comfort — in the roof-gardens, on the pavements, and on the bleachers. Certain it is that nine times out of ten, when dwellers in the country want to enjoy themselves, they go indoors. In most parts of the United States,

during the season in which the weather permits one to sit out of doors with any comfort, life is rendered a burden by flies, gnats, and mosquitoes, unless behind the protection of screens. For both town and city dwellers, these winged pests are the most serious obstacle to living the outdoor life, and particularly to sleeping in the open air, or with windows wide open.

"But why," inquires some superior person, "should we make these insect molehills into mountains, and dignify such trifles by dwelling upon them? Still more, why let them interfere with our happiness or our peace of mind?"

Until a decade or so ago, the superior person had the advantage of us. We had no answer ready for his lofty question. There appeared to be no adequate reason why we should not wrap ourselves in the mantle of a stoic philosophy, and decline to be irritated by pinpricks. We knew perfectly well that by sitting placid and unresisting, and possessing our souls in peace, the sum total of injury that we should suffer in an entire summer evening would be a few trifling punctures, and thirty minutes or so of itching.

Yet the individual was never yet born who would accept the situation in that sweetly reasonable light. One single sting is enough to set a man slapping and slamming wildly at his luckless face, to raise every ounce of him to fever pitch, to make him renounce his religion and turn from a cultured and civilized being into a bloodthirsty Comanche. Even where no bite is felt or feared, the mere tickling, clinging, crawling of a fly across the skin annoys us, as the late Bill Nye

expressed it, "as much as if he were a mule with red-hot shoes on."

To-day we can look the superior person fearlessly in the eye. Even our bad temper has been triumphantly vindicated. Nature knew what she was about when she made us loathe a fly, hate a gnat, and execrate a mosquito. They and their like are the deadliest enemies of mankind. The real battle of the human species for the possession of the earth — nay, even for the right to continue to exist upon its surface — must be fought, not with mammoths, but with mosquitoes; not with lions and tigers, but with flies and gnats; not with behemoths, but with bacilli.

Our instinct to kill insects at sight is perfectly sound. Out of the quarter of a million species now known to science, a mere handful are even remotely helpful to man, and most of these only by their power of living upon other and more dangerous insects. On the other hand, thousands of species are actively hostile to man, to his food-plants, and to his domestic animals. Whole tribes have been swept out of existence by the attack of insects carrying bacilli — as within the last two decades, in Central Africa, by the dread "sleeping sickness" carried by the tsetse fly. Whole nations have been weakened and crippled, and whole civilizations retarded, by another insect-borne disease, malaria.

Indeed, recent investigators have advanced the theory that the historic decline of both Greece and Rome was largely due to the ravages of this disease, brought into Europe by armies returning from wars in Asia and Africa. It may yet come, when we see things

in their true perspective, that the warriors of civilized nations will turn from slaughtering one another to battling against our insect enemies.

There is a Thirty Years' War for every uniformed soldier on the face of the earth against the mosquito alone, which would be attended by all the adventure, excitement, and risk of life, of actual warfare, developing to the full the military virtues of courage, initiative, daring, and devotion; and which, when it was ended, would have saved millions of lives, instead of destroying tens of thousands. It would have added nearly one fourth to the area of the inhabitable and productive regions of the globe. Turn every cannon and every battalion of artillery in the world against that Angel of the Pestilence, the house fly, and in ten years he would be exterminated, root and branch; and with him, half of our fifty thousand deaths in the United States every year from the summer diseases of children, one third of our dysenteries and summer sickness and cholera morbus, and one fourth of our typhoid, with not a little of our tuberculosis, our tetanus, and our boils and blood poisonings.

However, insects cannot be cast for the comforting part in life's drama played by the Devil of the old theologies, as an universal scapegoat and excuse for all human frailties and misfortunes. Dangerous and deadly as they are, they are only "middle-men," distributors, common carriers of evils which they have picked up from outside sources. For the most part, those outside sources are diseased or dirty human beings. So that we have really ourselves to thank for

most of the damage they do. The mosquito does not hatch, or create, in his own body, the germ of the disease that he carries, but sucks the plasmodium of malaria, and the poison of yellow fever, out of the blood of some human victim suffering from those diseases. So that malarial and yellow-fever districts now carefully screen the sufferers to prevent them from infecting the poor mosquitoes, and we can attack the spread of insect-borne diseases from both ends, as it were.

More important yet, closer study of their habits during the past five years has brought out the curious, and at first sight, incredible, fact that the majority of these insects which carry disease, such as the malarial mosquito, the yellow-fever mosquito, and the house fly, can live and multiply, apparently, only in the immediate neighborhood of human habitations. In other words, they are literally domestic animals, and part of our farm stock. This is absolutely true of the house fly and the yellow-fever mosquito, neither of which is ever found more than a mile or two, and usually not more than a few hundred yards, away from human habitations. Numerous species of the Anopheles, the only mosquito that can carry malaria, are found in the uninhabitable swamps, but seldom in numbers to exceed more than about one to the thousand of mosquitoes of other species. While in the houses and outbuildings of malarial districts, they will sometimes form one fourth, or even one half, of the mosquito population. Either they need a supply of human blood to enable them to thrive, or what is more probable, the

pools and ponds and water holes and shallow wells and reservoirs, formed either intentionally, or unintentionally, by man in his settlements, furnish them the special kind of breeding ground that they need. In every case, the consoling and most important fact remains, that we have the fate of all three of these insect pests in our own hands and can tolerate them, or wipe them out of existence, at will.

However, mosquitoes, gnats, and midges, whether they carry disease or not, are insufferable nuisances, like Mr. A. Ward's "Injuns," "pizen wherever found"; of no earthly advantage to us physically, and fearfully detrimental morally and religiously, and should be wiped out of existence everywhere in the neighborhood of human habitations. This sounds like a large order, but it is n't half so difficult as it sounds, unless you happen to be unfortunate enough to live within half a mile or so of some large undrainable swamps, or within four or five miles of salt marshes and tidal pools. Here, as often elsewhere, our foes are literally "they of our own household"; and a strict draining and cleaning up of your own grounds, garden, stable, barnyard, and back pasture will be sufficient largely to rid you and your verandas of these insect pests.

The method of operating against them is that of good King Herod — strangle them in their cradles. The one thing that all the tribes that buzz and sting require above everything else, is water to breed in. For some of the gnats and midges, merely damp, shaded, undrained ground is sufficient; and though much of this sort of surface can be got rid of by proper soil

drainage and by clearing up of thickets and underbrush so that the sun and air can reach the ground everywhere, they cannot always be entirely exterminated. But as their activity is greatest in the early spring when few summer visitors are in the country, and they are not known to carry any disease, — although one gnat (*Simulium*) is suspected of carrying the dread sub-tropical disease *pellagra*, — this is a comparatively easy matter.

No artificial thicket should be tolerated about a garden, or grounds, through which the sunlight and air do not penetrate freely; and where pine woods, or natural thickets, near a house cannot be cleared sufficiently for this purpose, the condition can be considerably improved both for gnats, midges, and the smaller varieties of mosquitoes, by sprinkling any damp places in the ground, or marshy, mossy spots, with kerosene, or any form of crude or refined petroleum, two or three times a month.

All mosquitoes, however, and indeed most gnats and wood flies of any size, or viciousness, pass through an aquatic stage in the wriggler or larval stage of their development, which requires water in fair depths and amounts for them to swim in; their periods varying from two to six weeks. Indeed, in the case of the most dangerous of all, the malarial mosquito, three months. The keynote of our campaign is to deprive them of this water, lacking which, they are utterly unable to develop. Go over every square yard of the territory within two hundred yards of your house, and wherever you find a hollow in which water accumulates during

rain, a pool or marshy spot, a tub, or ornamental pond, either fill it up, drain it, or coat it with coal oil, and you will find that you have, in nine cases out of ten, practically rid yourself of mosquitoes and gnats.

It is almost incredible what short-lived and apparently trivial accumulations of water will suffice for some of these pests to breed in. Anything that will hold water three fourths of an inch or more in depth for ten days, is sufficient; even such exceedingly insignificant-looking lake basins as a tomato can, or a sardine tin, or an old boot, or rubber, or the hollow of a broken piece of crockery, if they happen to be shaded so that the sun cannot evaporate within ten days the water which they may catch during a rain storm.

Even the buildings themselves should be inspected for catch-basins of this description, as was illustrated in the most surprising manner, in the campaign of extermination waged with such success against the late epidemic of yellow fever in New Orleans. The principal breeding place of the yellow-fever mosquito (*Stegomyia*) was found to be the cisterns in which rain water was caught and stored for household water. But even after these had been thoroughly cleaned out and screened over with the finest of wire mesh, certain of the infected houses were found to be producing new broods of mosquitoes. They seemed to be coming out of the rooms themselves, and were not found in the yards or gardens surrounding. A little closer search revealed the astounding fact that they were actually breeding in the pitchers of water kept standing in the bedrooms, the careless negro servants being in the

habit of simply filling up the pitchers every day with fresh water, without taking the trouble of emptying out the old water, or cleaning the pitchers.

If there be a water-butt or cistern anywhere about your premises, empty it and clean it out thoroughly to destroy any wriggling larvæ, which may be already present in it; and then cover it over either with a solid cover, or with a fine mesh wire screen. Shallow wells should also be carefully boxed over and closed in tightly; thus preventing the entrance of mosquitoes, as well as of accidental fouling. Where there are any accumulations of water, such as lily ponds, fish ponds, duck ponds, or the like, that you cannot make up your mind to get rid of, they can be rendered comparatively safe by pouring kerosene upon their surface at the rate of a gallon for each thousand square feet, two or three times a month. This acts in two ways, both in being directly poisonous to the mother mosquito when she approaches the water to desposit her eggs, and by forming a film over the surface of the water which prevents the larvæ from getting air when they come up to the surface to breathe, after their curious amphibious fashion. One or two species, it is true, are able to break through this barrier by the curious device of an odd extensible air tube, which they can push up through the film; but they are neither numerous nor troublesome.

Where large swamps or ponds, lakes or rivers exist in the neighborhood, within half a mile or so, then joint action on the part of the community is needed. But even this is neither as expensive nor as difficult as

might, at first, be supposed. It has long been known that mosquitoes are not nearly so troublesome along the banks of deep, swift-flowing rivers, or around lakes with clean, sandy, or steep rocky shores, as they are in shallow pools and swamps. The reason for this is that the deadliest enemy of the mosquito larva are fish of all sorts, particularly minnows, perch, sun-fish, and the like. Wherever they can freely penetrate, not many mosquito babies have a chance to survive; so that even where a large-sized pond, lake, or river is to be attacked, the only part really requiring attention is its margin, where, as the water of the pond or river falls during summer, little pools or swampy places may be left behind, which are cut off from the main body of the pond, and which fish, however small, consequently cannot penetrate. These can usually be dealt with quite readily in various ways, according to their size: if they are very small, by filling up; if a little larger, by coating, or by a short ditch to drain them into the main body of water. If this be prevented by rocky ledges, or other obstacles, they can be coated with kerosene, or by ingeniously impressing Nature's check against the mosquito into our service, by stocking them with small fish. Four or five shiners, or small fish, dipped out with a fish net and dumped into one of these ponds, will live like lords on mosquito omelettes furnished them over night by the trustful mother birds.

Even the apparently hopeless task of attacking the pools and inlets and salt marshes and salt meadows of the sea coast can be undertaken with fair prospects

of success. The same principles apply here. Pools or creeks which are filled at every tide need not be interfered with, the fish will take care of them; it is only these tidal pools high up on the beaches which are reached only at the highest tides every month, and then left completely isolated, that require attention. These can either be drained by cutting a ditch through the sand ridge which holds them there, by stocking with fish, or coating with oil.

The beach, or salt, mosquito is peculiarly troublesome because, contrary to the almost invariable rule of the fresh-water mosquitoes, who are "home bodies," and limit their activities, except when carried by winds, to an area of only a few hundred yards and often a few hundred feet from the place they are hatched, he rises high into the air and, launching his aëroplane upon the sea breezes, will be carried ten, twenty, and even thirty miles inland. Why they do it is a mystery, for these profanity-breeding swarms, which form the great masses of the world-famous Jersey mosquito, consist almost entirely of sterile females who never return to the place where they were born, nor reproduce their kind anywhere else. It really looks as if they enjoyed the exasperation they produce sufficiently to travel thirty miles to bite somebody; one of the few instances in nature of original sin or pure cussedness.

Their fertile sisters, by the way, who are only about one one-hundredth as numerous, mate and settle down and go to light housekeeping at once, within a few hundred feet of the pool in which they were bred; and

make no trouble for anybody, except perhaps their husbands, and a few rash and red-nosed fishermen who deserve all they get. These were the bush-whackers who for several years thwarted the success, and brought ridicule upon the public campaigns of extermination against the mosquito along Staten Island and the Hackensack marshes. But their secret has now been learned, and prohibition is beginning to really prohibit.

Of course these methods are inapplicable when camping out, or hunting, or fishing, partly on account of the large area which would have to be covered, and partly from the fact that either from the nature of the sport, or game, or for the sake of water supply, camps almost always have to be in some region where there are plenty of breeding places for mosquitoes. It is, however, well worth while when pitching your tent, or making camp, to go even fifty or a hundred yards from the water for the sake of getting up on some hill or ridge above the level of the surrounding country, and especially where there is an opportunity for a breeze to strike between you and the nearest water. On the prairies, or in thin woods, an elevation of even only ten or fifteen feet, which catches the breeze, will make all the difference in your comfort between heaven and the other place.

The mosquito is a very weak flier, carries an enormous sail area in proportion to his beam and tonnage, and like most balloons, even dirigible ones, can fly only with the wind, scarcely at all across it, and not an inch against it. If the camp is to last for more than

four or five days, it is well worth while to patrol the swampy places, the edges of lakes and pools within a hundred yards of it, with the kerosene can. This may do much to mitigate your tortures, if it does not entirely relieve them.

The various methods and means of endeavoring to prevent mosquitoes from biting after they have actually arrived upon the scene, are simply exasperating in their inefficiency. Most of them consist of volatile substances, usually aromatic oils, or essences, which are supposed to give off vapors irritating, or repulsive, to the mosquito. If they could be applied to the mosquito directly, instead of to your unfortunate face and hands, they might do some real good. But most of them appear to have the unfortunate faculty of being more disagreeable to your skin, or your olfactory nerve, than they are to the mosquito. A few of them, such as the famous old oil of pennyroyal and that good old stand-by, beech tar, may possibly discourage six out of the dozen mosquitoes who would otherwise have attacked you. But you won't be able to distinguish much appreciable difference between the annoyance and exasperation caused by the half dozen bites and that of the whole dozen. Beech tar, if applied after the ancient fashion of the woods, that is to say, a full coat on entering the woods, an additional one every morning and evening, and no washing until you return to civilization may, with the assistance of wood smoke, dust, and fish slime, protect you by producing a coating which would turn the bill of even the most ferocious bloodsucker.

Much the same verdict must be passed upon the various methods of filling the air with irritating vapors. If they are thin, they are a delusion and a snare; and if thick enough to be effective, torture their makers more than they do the insects. The old familiar smudge will drive away a few of the lighter-minded and more trifling young females, or giddy old spinsters, of the buzzing crowd; but a really determined, hungry old hen mosquito, loaded with eggs and determined to have a meal of blood for her coming brood, will plunge through the thickest smoke and get it with the courage and determination of the Light Brigade at Balaclava.

Measures for the relief of discomfort after the bite has been inflicted are numerous, but as everywhere else in medicine, their unsatisfactoriness is in direct proportion to their number. Almost everybody knows a "sure cure" for the itching of mosquito bites. But it is either never available, or refuses to work on anybody but the one who recommends it. There is a valid reason for this ineffectiveness in the nature of the bite. The beak or proboscis of the female mosquito has been driven down through the skin until it reached a tiny capillary, or blood vessel. Its charge of poison is heaviest at the tip, so that the cause of the itching is lodged not merely completely under, but a sixteenth of an inch below the skin, and as the human skin is almost absolutely water-proof, remedies poured on or rubbed over the surface of the bite have very little chance of reaching the site of the trouble. Fortunately, there is one consoling feature about these bites,

and that is that, intensely irritating and disfiguring as they are, they are not in the slightest degree dangerous to life and health, unless they happen to have been produced by a mosquito infected with malaria, or yellow fever. The irritation they produce is quite short-lived, seldom lasting more than about twenty or thirty minutes, except in unusually irritable skins. Therefore, any remedy which will relieve this irritation, or which will temporarily deaden the nerves of the surface of the skin, will be sufficient to "cure." The two groups of remedies which will produce the greatest relief are usually cooling lotions, especially those of alkaline reaction, such as is made of the familiar household soda, or containing from ten to twenty per cent of alcohol, which by its evaporation produces a cooling effect; arnica, witch hazel, or camphor, owe most of their virtues and healing effects to the small percentage of alcohol which they contain.

The other group are the stronger aromatic oils, or the substances extracted from them, such as camphor, menthol, oil of cloves, oil of capsicum, which, though somewhat irritating, have the power of numbing for a time the nerves of the skin when applied to it. One of the most effective of these temporary relievers of the itching is a combination of either menthol or camphor with equal parts of chloral hydrate. This can be readily made by rubbing the two together, remembering, of course, that chloral hydrate is a poison if taken internally in more than quarter teaspoonful doses; but combinations of them have now been prepared and are carried in most drug-stores

for the temporary relief of rheumatism and neuralgia, put up in little lead, or other collapsible metal tubes, which can be very readily carried in the pocket upon a picnic or camping trip, and a drop or two squeezed into the bite. These will often very markedly relieve the itching for fifteen or twenty minutes, by which time, in most skins, it will have almost subsided; although upon some skins they appear to produce little or no effect.

One thing important to be remembered is that although it does no particular harm to rub the swellings caused by the bites, scratching them or rubbing so vigorously as to break the surface of the skin ought by all means to be avoided, as this opens a tempting avenue for infection to any wandering pus germ, or often to the little mild irritation germs which dwell upon the surface of our skins. The worst results of even severe mosquito bites come from secondary infections of this sort, and are not due to the poison of the original bite at all, except in the indirect way that this started the scratching that broke the skin. In proportion to their extreme annoyance, these bites are singularly harmless. Most of the stories told of men, or animals, lost in the woods, going mad, or dying from the agony of innumerable insect bites, either lack confirmation, or are clouded by the fact that in most of these instances, starvation, exposure, and in some cases, thirst, have also produced their effects. It is, however, no very uncommon thing, especially for a tenderfoot, on first entering the woods, if he be severely bitten by either mosquitoes, black flies, or deer

flies, to be thrown into a state of irritation bordering upon mild fever, with headache, and even some swelling of the glands of the neck. This irritation, however, seldom goes further than this, and after a few days he either becomes more expert in dodging and fighting, or else he becomes, as most of the guides believe, somewhat acclimated. So that the bites, while they still annoy him, no longer produce these unpleasant after-effects.

It may promote our peace of mind somewhat to know that outside of the gnat-mosquito family, and a few of the biting flies, the great majority of insects in our temperate latitudes either do not bite man, or produce trifling or insignificant effects if they do. The general belief that spiders are exceedingly likely to bite is almost entirely without foundation, scarcely a well-authenticated instance being on record of a human being being bitten by any of our Northern spiders; although a few, of course, of the large hunting spiders of the tropics and sub-tropics, such as the tarantula, may be guilty of this. The famous "*tarantelle*" and other "spider-bite" legends of the folk-stories are pure fairy-tales.

The bites of ants, though annoying, seldom produce even swelling or irritation for more than ten or fifteen minutes; while the stings of bees, wasps, and hornets, though intensely painful, are not in any way dangerous to health or life, unless they should have been inflicted in enormous numbers, or upon some of the soft parts in or about the mouth, as for instance, a wasp taken into the mouth with a bite of fruit, when

the swelling it produces may threaten suffocation. The bite of ants and the sting of bees and wasps all owe their irritation to the same substance — formic acid, closely related to the now famous disinfectant, formalin or formaldehyde. Indeed, the name of this latter was taken from the Latin *formica*, an ant. Whether this is what gives ants their alleged curative effect upon rheumatism, or not, is an open question. But certainly, if you got enough of them they would make you forget your rheumatism, or any other trouble you happen to have, for a few days at least.

Caterpillars and "worms" of all sorts practically never bite human beings. The only way in which they cause irritation is that the hairs upon the hairy and woolly varieties are often barb-tipped and poisonous, and if thrust into the human skin and broken off, will sometimes set up a little superficial irritation. It is not necessary either to make pets of, or become friendly with them on this account; indeed, on general principles, it is best to mash them every chance you get, on the principle of the famous old schoolmaster, who said that "it never did any harm to thrash a boy, for if he had n't done something to deserve it, he was just going to." Many of them either attack fruit and vegetables themselves, or hatch into moths or large flies which do enormous damage. So that our natural tendency to "needlessly set foot upon a worm" is a wise one.

CHAPTER XVII

INSOMNIA AND INSOMNIACS

THE choicest gifts of the Gods come unsought, and by strange irony of fate, the more eagerly we seek them, the more perversely they refuse to come. Ninety-nine and nine tenths per cent of the *Genus Humanum*, at a more or less fixed hour in the evening of every day, find their limbs relaxing, their breathing deepening, and a sensation of drowsiness stealing over them. We set no special value upon this drowsiness — indeed, at an early stage of our career we are apt to bitterly resent it and fight against it with clenched fists shoved vigorously into the eyes. Many of us, all our lives long, clear through to our second childhood, rather dislike the sensation than otherwise and loathe the idea of going to bed. But when some night we lay our heads upon our pillow and find that instead of dropping swiftly off into unconsciousness, we are staring wide-eyed into the darkness, one image chasing another through our brains with the swiftness of a racing automobile, we suddenly discover that we have lost the most priceless gift in the world, and are ready to move heaven and earth to get it back again. And the more eagerly we long for it, the more elaborately we pursue it, the more it refuses to come. After a few nights of this sort of thing, we give our condition a name and say we have insomnia, proudly or panic-strickenly as

the case may be, and this drives sleep further than ever from our eyelids.

We recall, or some kind friend reminds us of, stories of how criminals are tortured to death in the Orient simply by forcibly preventing them from going to sleep, or how So-and-So, after walking the floor with insomnia for several weeks, broke down and was taken to the asylum. We go to bed with the firm conviction that we are "not going to get a wink of sleep this night" — and then we are insomniacs!

Sleep is most useful and beneficial, but before we resign ourselves to an imminent nervous break-down, or a Niagara-like plunge toward an asylum, it is well to remember two or three important facts: First, that we have no reliable evidence that loss of sleep, however prolonged — save by deliberate physical violence, and even these instances are little better supported than most traveler's tales — ever killed any one, or drove them insane. Second, that even in the deepest sleep, we never completely lose consciousness, or, to put it briefly, we are not asleep all over at once; so that we may be conscious of many things that are happening about us and yet be soundly and restfully asleep. Third, that we vary widely, as individuals, in the actual amount of sleep that we require, according to our age, the nature of our work, our nutrition, etc. So that it is quite possible for a man or woman in a light, unexhausting occupation, with abundance of food and good physical surroundings, to go for weeks and even months on only a few hours' sleep out of the twenty-four.

Fourth, that ninety-five per cent of all cases of

insomnia are symptoms of some other form of disturbance, either of physical health, or of the mind, or emotions, from worry, grief, or overstrain, and will disappear completely when their cause is removed. Get rid of the cause of your worry, or strain, if you can; or if not, make up your mind to bear it until the merciful forgetfulness which comes with the passage of time steals to your relief.

Correct any bad physical habits you may have got into, and trust Nature — she will do the rest. If you are giving yourself the chance, the number of hours in bed, to take all the eight or nine hours' sleep, which on general principles you need, you may rest assured that you are getting much more nearly what you need than you think you are.

One of the most curious but cheering things about insomnia is, that we know so little about the real nature of its opposite — sleep! All the theories that have been advanced as to the causation of sleep have practically gone by the board, and our most modern knowledge of it is most exclusively negative. We know pretty certainly that it is not due wholly, or even chiefly, to the narcotic effect of waste poisons accumulated in the blood, nor to *anæmia*, or bloodlessness, of the brain; nor to the variations of oxygen and carbon dioxide in the body; least of all to darkness and light, or food, or work.

Our study of the habits of animals has given us no light upon the subject. Some animals appear to sleep the greater part of the time and only wake up to go in search of food for themselves or their young, or in the

mating seasons. Some sleep in the day, others in the night; it is doubtful whether some, like fishes and frogs, ever sleep at all in the true sense of the term, although they pass into a state of torpidity in certain seasons of the year. The vast majority of us, under average conditions, require in childhood from ten to twelve hours, and in adult life from eight to ten hours of sleep a day; and yet, under various circumstances, we have extraordinary powers of going for weeks with comparatively few hours out of the twenty-four.

So if you are keeping fairly close to your average weight, have a fair appetite and a good capacity for work, there is little need to worry seriously as to whether you are getting three, five, or nine hours' sleep during the night. Rid yourself of the conviction that it is vitally and tremendously important that you shall get eight full hours of — if I may use the term — *conscious* sleep every night, and you have taken a long step in the direction of getting rid of your insomnia.

The man who is in greatest danger from sleeplessness is the man who sleeps soundly, but who does not allow himself a sufficient number of hours in bed. Give yourself nine hours of rest in a comfortable bed in a well-ventilated room, and you need not be too critical as to whether you are convinced that you have spent the whole of that time in sleep or not. Every one who has suffered from what is ordinarily described as a restless night, can recall how much more rested he felt in the morning than he expected to feel, unless his restlessness were due to pain, or discomfort, from some definite diseased condition.

One of the most curious and puzzling things about insomnia is the difficulty — I had almost said *impossibility* — of determining positively just how many hours of the night we actually are asleep, or awake, whichever way you prefer to express it. Much of this difficulty is inherent, from the fact that naturally we don't remember, and have no means of recording, or determining, the hours during which we were sound asleep; while those in which we were awake stand out clear and unforgettable. One extraordinary fact, long ago noted in the study of insomnia, is that its victims invariably sleep much better when they are out of the hearing of the ticking of a clock, or the striking or tolling of a bell, or even when they are simply deprived of their watches. In fact, the whimsical paradox has not lacked supporters that the prevalence of insomnia in modern times is closely associated with the greater commonness of clocks and watches.

One of the most singular and bizarre problems in the study of insomnia is that it is possible for a victim to have heard the clock on the stairs, or in a neighboring tower, strike every hour from eleven to five and yet have been asleep nine tenths of the time. This is due to the fact, of which dreams and nightmares are vivid and commonplace proof, that our loss of consciousness, either bodily or mental, in sleep, is never absolutely complete. We are never asleep "all over," so to speak. In even the deepest slumber, we still respond to impressions upon all our senses, and in lighter sleep these impressions may actually enter into mental consciousness as well and transform themselves into dreams and

memories. As of course every one knows, if a bright light is flashed in the face of a sleeper, he will contract his eyelids, or move his face away. If a current of cool air be fanned against his neck, he will pull up the cover; if the sole of his foot is tickled, he will pull it away, or lash out vigorously at the disturber. These simple muscular responses are taken most despicable advantage of by one of the expert schools of professional thieves in the Orient who, by gently breathing in their victim's face, or by tickling his hands or feet, or lifting one side of his bed or mattress and depressing the other, will cause him to roll over in any direction that they desire, rob him not only of what may lie under his pillow, but of the blanket in which he has rolled himself up, or the rug on which he is lying; and by gently breathing upon his flesh as it is exposed, to prevent its chilling, will even strip him of every article of clothing that he has on, without ever waking him up. Words whispered into a sleeper's ear persistently, will sometimes be repeated by him; sensations experienced during the night will change themselves into dreams, as of fighting, or being choked by some antagonist, or by a snake, because of an accumulation of gas in the stomach; dreams of Arctic Relief Expeditions, on a chilly night, or because of the falling off of the blankets; dreams of fireworks, because of a light shining in the face, and so on.

Another illustration of the persistence of the higher consciousness in sleep is in the power which most of us possess of waking up at, or near, a certain hour, by merely making up our minds to do so when we retire.

If we are within hearing of the striking of a clock, this is a comparatively simple matter and our waking will even be timed with a singular degree of accuracy. But even where we have not this exterior aid, we seem to possess some crude measure, or estimate, of the passage of time, although if we will watch closely and dispassionately, we will find that our waking at a certain hour is usually achieved chiefly by dint of waking up at frequent intervals all through the night, until finally the desired hour arrives and we get up.

It is a comparatively simple feat for the chronic insomniac after he has heard the clock strike two or three times and got, as it were, into his chronological stride, to either wake up at the expiration of each hour in time to hear it strike, or come so near the surface of wakefulness as to be awakened by its first stroke and count the remainder.

A similar "checking" process upon noises and sounds has of course long been familiar in the opposite direction, so to speak — namely, that where we have become accustomed to a constant, persistent sound, such as the noise of a mill, or the running of an engine, or the chugging of the screw on an Atlantic liner, the instant that this stops, we wake up at once. It is highly probable that our well-known inability to sleep well and soundly the first night in a strange room, or a new bed, is due not only to the presence of unfamiliar sounds, jars, lights, and other sensations, but also to the absence of the familiar sounds which have become, as it were, the sub-stratum of our sleeping consciousness. It is no uncommon experience for city dwellers to be

unable to sleep well during their first night or two in the country, on account, as they whimsically express it, of the "awful and noisy silence." And a like experience is not unknown among campers, or hunters, the first night or two out in the eerie stillness of the woods.

Instances are even recorded where individuals sleeping near a railroad line on which one or more night expresses thundered past at fixed and regular hours, would pay no attention whatever to the train if it came on, or within twenty minutes of, time, but would be awakened promptly if it were more than half an hour late.

So one thing you may feel fairly sure of, and that is, however positive you may be that you have not slept a wink all night, or that you have heard every hour, or every quarter, strike from ten to six, if you have been resting quietly between the sheets without positive discomfort of any sort and without getting up and pacing the floor, or reading, or doing something definitely active, you have been getting a great deal more sleep than you think you have, and probably nearly as much as you require. Insomniacs should adopt something of the cheerful philosophy of Colonel Carter of Kentucky who, on one of his visits North, was asked by a neurasthenic friend, who was impressed by his cheerful and care-free appearance, how he managed to sleep so well every night.

"My dear suh," said the Colonel, "I nevah have any trouble about that. I just take a nightcap of two fingers of the best rye whiskey every night, just before going to bed, and I sleep like a child till daylight. If I don't

get to sleep right away, I get up and take two more fingers of whiskey."

"Well, but," persisted the anxious one, "supposing that does n't put you to sleep, what do you do?"

"Well, suh, I just go over to the dresser and I take four fingers of whiskey."

"But if that should n't put you to sleep?"

"Why, suh by that time I don't care a d—n whether I ever get to sleep or not."

Insomnia is both a penalty and a pathologic luxury of civilization. It is a mark of neurologic aristocracy, as distinctly and unquestionably as gout is a mark of blue blood and ancient lineage. Those who possess it may be as vain of it as of a coronet on their note-paper. The great mass of mankind seldom suffer from insomnia — they have too many other troubles.

To hear an insomniac recite his woes as he holds you with his glittering eye, one would think that to lie awake two or three hours in a comfortable bed, listening to the clock as it strikes was one of the deadliest diseases that afflicted humanity; and night-long sleepy-headedness the most precious and vital privilege of man.

As a matter of fact, insomnia, like the devil, is not so black as it is painted. It is n't the staying awake for an hour or two at night that 's abnormal, so much as the worrying about it all the next day. Most of us in our salad days — and in later life, while healthy and vigorous — think little of losing not merely an hour's but a night's sleep. We echo the gay philosophy of Tom Moore that —

"The best of all ways to lengthen our days
Is to steal a few hours from the night."

It is a reckless and easy-going philosophy, but it has some justification in the ease with which deprivations of this sort can be made good the following night, so long as the beautiful elasticity of youth lasts, and the rigidity of advancing years draws not nigh.

Nor did the childhood of the world worry itself much about insomnia, for the reason that it had such unlimited opportunities of making up for the loss, and so comparatively little to keep it awake at night — or in the day-time, either. It also retained some of the old-time power of hibernation, which enabled it to drop peacefully off to sleep, in order to fill up the time, when it had nothing else to do. Its principal objection to lying awake at night was on account of the things which one might happen to see in the interval — things that flapped and glared at the windows, or stood rigid and terrible at the head of your bed, and would "git you" if you did n't pull the blankets over your head. Perhaps part of the violent objection that we have to lying awake at night is a survival, a vague and indefinable fear that some of these bogies of the nursery days of our minds may reappear.

All the protections and safeguards of twenty centuries of civilization seem to drop away from us, and leave us naked and unprotected to our enemies, when we wake "in the dim and dead of night, when the rain is on the roof." Every sound must be explained and strictly accounted for. It is probably only a rat, or the wind rattling the windows, but it *may* be a jabber-

wock, or a burglar! Every moving shadow reveals an enemy with drawn, uplifted knife; every point of light is the gleaming eyeball of some jungle beast. This is the hour when the gods were born, when even the boldest must have someone to appeal to for protection. If we were quite sure that nothing terrible would happen to us during our hours of wakefulness, perhaps we should not dread insomnia so much.

Of course, to lose two hours of sleep, out of our necessary eight, is both unpleasant and unwholesome — like being robbed of one fourth of our proper supply of food. If it were to continue indefinitely, it would ultimately result in physical bankruptcy. But the human mechanism is astonishingly elastic. It can allow itself a surprising amount of leeway, and yet keep safely on its course. If you give yourself nine hours in bed every night, nothing is easier than for the body to make good its deficit at any time, almost without your noticing it. The mere fact that you lay awake two hours last night and three hours the night before is no proof that the same thing is going to repeat itself every night for the next month. Indeed, not more than one case of insomnia in fifty ever continues so long, or so constantly, as to cause the health to suffer appreciably from actual loss of sleep.

Unless there is some positive disease of body or some serious disturbance of mind, the more sleep you lose for two or three nights in succession, the more likely you are to make it up in the next three or four nights. Nature is perpetually redressing the sleep balance, without your being aware of what she is doing. We can

readily tell when we eat, and how much we eat, but no man living can say positively when or how long he is asleep. It is only the time when he is awake that he can testify to with certainty; and his senses may grossly deceive him even as to that.

The gravity of both sleeplessness and loss of appetite depends almost entirely upon the seriousness and obstinacy of their cause. So far as the actual loss of food or sleep is concerned, the human body has almost incredible powers of enduring both starvation and wakefulness without serious or permanent injury. Remember that the strongest and most unconquerable tendency of a normal individual is to sleep when he is tired and eat when his stomach is empty; and that it takes some positive and persistent obstacle to prevent him from indulging in either of these vital habits.

When your tissues get to a point where they really need and demand sleep, you could not stay awake if someone stood over you with a drawn sword. Remove the cause of your insomnia, and sleep will follow as certainly as the night the day. If this cause be a definite or organic disease, then the gravity of your insomnia will be the gravity and obduracy of this particular disease. If it be due to some form of grief, or bereavement, you may rest assured that sooner or later you will fall into the heavy, dreamless sleep of exhaustion, or that the deadening effect of the passage of time will dull the edge of your agony.

The cheering thing to remember, in insomnia, is that in nine cases out of ten the cause is either completely

removable, or will mitigate itself gradually with the merciful oblivion of time.

Insomnia is always a symptom of some physical disturbance or mental strain, and ought by no means to be ignored or lightly regarded. It is, in fact, one of our most invaluable danger-signals, the prompt heeding of which will save us many a breakdown. Yet the thing to be borne clearly in mind is its curious power of self-exaggeration, its tendency to make us overestimate both the amount of our wakefulness and the seriousness of the results which are likely to follow from it.

There are forms of insomnia which are the first sign of physical breakdown, or mental unbalance; and though these do not form more than one per cent — scarcely more than one in five hundred — of all cases, the impression, unfortunately, seems to have got abroad that all forms of insomnia tend to carry their victims in this direction, and will inevitably end in some catastrophe, unless checked. As a matter of fact, even the ten per cent of cases which are not due to some temporary or readily removable cause, and which tend to persist in milder or severer form, in spite of all that can be done for them — even these might in the vast majority of instances, run unchanged for months, and even years, without seriously or permanently undermining the health.

But of course you cannot make anybody who has insomnia believe this! That is one of the fundamental symptoms of his condition. In spite of the best and coolest judgment which he can bring to bear upon his condition, he *will* die, and nobody *shall* save him,

unless this terrible and intolerable loss of sleep is stopped! —

He is the best illustration possible of the homely old distich:—

> "A man convinced against his will
> Is of the same opinion still."

And the difficulties of convincing him are fundamental and peculiar. First and foremost, to prove to a man that he is asleep is like attempting to prove a negative, only more so. No one knows when, or how long, he is asleep. He only knows what his last memories were on dozing off, and what time it was when he awoke. The playful little agreement that we used to make in the happy days of childhood, when we slept three or four in a room, that the one who fell asleep first would whistle, was never yet fulfilled. Unless some genius can invent a paradoxical sort of a clock that we can hear when we are asleep and cannot hear when we are awake, we shall never be able to demonstrate positively the exact amount of our slumbers or of our wakefulness.

How difficult it is to make any one who is skeptical on the subject believe that he has been asleep is amusingly illustrated by a story told by an eminent physician of the experiments with laughing gas, in the early days of its use.

Its inhalation became one of the popular fads, and young people at evening parties would amuse themselves by getting some doctor friend to give laughing gas to three or four of their number, and watching the result. On one of these occasions, the gas was admin-

istered to a young lady and two young men, all of whom went soundly to sleep, and woke up again in a few minutes. Two of them admitted the success of the experiment, but the third — a particularly pig-headed young fellow — insisted that he had never been asleep at all, but had just been pretending; and had heard every word of what had been said while he was supposed to be unconscious.

For several minutes they argued with him without avail, and then one of the young ladies with a mischievous smile whispered something in the ear of the doctor. The doctor turned to the skeptic and said:—

"Well now, Mr. Smith, perhaps that time it was not a success. Suppose we try it again!"

To this the doubter readily consented. When he was fully under the influence, the doctor told one of his friends to remove his shoes and stockings. To the intense amusement of everybody in the room, the young fellow was evidently in the frame of mind of the lady from the rural districts who, on seeing a porcelain bath-tub for the first time, declared that it looked so good that she could hardly wait until Saturday night to try it — and it was late on Friday in his calendar.

As soon as he regained consciousness, he again began protesting that he had never been asleep, had just wanted to fool them, and so forth; but his protestations were quickly cut short by the doctor's quietly smiling and pointing to his feet. The youth made one wild grab for his shoes and stockings, bolted precipitately from the room, and never made any further attempt to deny that he had been sound asleep.

Naturally, no one can remember anything about the time when he was actually asleep, though the hours during which he was awake stand out vividly and convincingly. This is not to say, of course, that many individuals do not suffer both in their comfort and in their health from chronic and persistent loss of sleep, but only that the amount lost, and the damage done thereby, is never as great as it appears to the sufferers.

Another of the psychic characteristics of insomnia is that it seems to fill its victims with a sort of morbid pride in their martyrdom. "Woe be unto them if they preach not the gospel of sleeplessness." They seem to be seized with a positive *cacoethes loquendi*, an overwhelming impulse to talk about their experiences. If they happen to be gifted with the pen, they write essays about the subject, like De Quincey and Stevenson. If they are musicians they compose *études* to express their sensations, like Heller's "Nuits Blanches." If they are simply private citizens, they talk about their symptoms over their teacups, or their steins, until one imagines that the whole round world is full of the victims of insomnia.

As a matter of fact, obstinate and serious forms of the disease are far from common; and the average family physician is not called upon to prescribe for sleeplessness half as often as is popularly believed. One good, wide-awake case of insomnia, determined to get something to put him, or her, to sleep, will go the rounds of every doctor in town and multiply his apparent numerousness tenfold.

Whether it is or is not becoming more common than

formerly, it is difficult to say; but there appears to be little evidence in support of the popular belief in its greater prevalence, save in the sense that we are becoming more sensitive to lighter ailments and demanding higher standards of health and comfort than formerly.

One form of insomnia consists chiefly of a luckless sort of split in our consciousness, which keeps one corner of the mind awake to see whether the rest of it is asleep or not, and to report in the morning. That the consciousness of many insomniacs is playing them this curious trick is abundantly proven by the test of direct observation.

The great majority of sufferers from insomnia are, of course, not sick enough to go to a hospital, or even to have a nurse. Sometimes, however, they are induced to enter a sanitarium; and when the night nurse, as a means of determining the severity of their trouble, is ordered to include them in her rounds and look in on them at regular intervals, three times out of four, however loud their protestations of never closing an eye all night, they are found sleeping soundly, and even snoring.

Another proof of the unreal character of many cases of insomnia is the readiness with which they yield to suggestion, or some other form of mental treatment. Naturally, that which exists chiefly in the mind can be cured by the mind. Neurologists, or specialists in nervous diseases, into whose hands these sufferers usually fall sooner or later, have reported brilliant successes in cases that had defied every other form of treatment, by first telling the patient what wonderful

results had been obtained by this method, and what influence the mind had over disease; and then by directing him to repeat once or twice an hour, all through the day: —

"I am going to have a good night's sleep. To-night I am going to sleep like a top. I shall have a bully night's rest!"

The sufferer is ordered to repeat the same formula if he happens to wake in the night, and to keep on repeating it until he falls asleep again. In addition, a card with the cheering words printed upon it is hung over his dressing-table, where he can let his eyes rest upon it the last thing before he closes them upon the pillow. In a short time the patient becomes mildly self-hypnotized. He drops the bad mental habit of taking his own sleep-pulse, as it were, and listening for the clock to strike all night long. He begins to believe he is getting the better of his trouble, instead of its mastering him; and in a few weeks he is convinced that he is sleeping soundly nine tenths of the night — which has been the fact from the beginning. This is a fair example of the way in which hypnotism and suggestion usually "cure" in medicine.

Although insomnia is not going to drive us, either as individuals or as a race, into nervous bankruptcy, yet it is a very real and troublesome affliction, which attacks many of us occasionally, and some of us frequently. The interesting question is, as ever, the practical one — what are we going to do about it?

The first thing to get clearly in mind is that sleeplessness is usually as easily curable as it is common;

and that even those cases which prove obstinate, and resist our best endeavors, can almost invariably be brought within such limits as will not seriously interfere with either comfort or efficiency. The whole interest and practical importance of the problem centre not in the fact that you don't sleep, but in the question why you don't.

Paradoxical as it may sound, many persons are unable to sleep well because they are too tired. They have driven themselves so incessantly, day in and day out, fifty-two weeks out of the year, in one rut and one mill-horse round, and their brains are so loaded with fatigue toxins, that they fall into a sort of waking delirium. All night they keep on thinking round and round and round in the same circles they have been following during the day, until they are ready to drop dead, like stampeded cattle or Marathon racers.

To imagine that the peaceful stillness of the country will make you sleep, when the whole cyclone of the city is roaring and raging in your brain, is simply ludicrous. If you can't sleep, it is a sign for you to make a change of hours — or jobs! To do anything, or take anything, at night to make yourself sleep is like locking the stable-door after the horse is stolen. To your tired nervous system, it adds insult to injury. Warmth to the feet, or cold to the head, or reciting the Declaration of Independence, is like trying to break a log-jam with a tooth-pick.

It must not be forgotten that a small group of insomniacs suffer for just the opposite reason — because they are never sufficiently wide awake in the daytime,

in any intelligent sense, to notice the difference when they go to sleep. People who have little to do, and few real interests in life, often sleep just about as badly as they do everything else. In these cases, the best cure is to get something to do that will really wake the patient up in the daytime.

Others imagine themselves in danger of becoming nervous wrecks because they can't fill up with sleep all the time they have to waste in the twenty-four hours. One of my colleagues, some years ago, told me that he had been consulted by a lady of his acquaintance, who came into his office looking the very picture of flabby woe.

"Oh, doctor," she said, "what ever shall I do? I can't get a wink of sleep after four o'clock in the morning, and I'm becoming a nervous wreck!"

The patient was a stout, comfortable-looking young married woman, of well-to-do family, and living under most favorable physical conditions. The doctor took her pulse, looked at her tongue, sounded her chest, made inquiries as to her digestion, her appetite, her household cares and other duties. Everything appeared to be perfectly normal and healthy. She suffered no pain, she had no sign of any organic disease. There was nothing in her financial or domestic circumstances to worry her in the slightest — she just simply woke up about four o'clock every morning, and tossed about wide-eyed until breakfast time.

The doctor was beginning to feel nonplussed; finally it occurred to him to inquire as to her hours of retiring.

"Oh, I'm always very particular about that, doctor.

I am very regular about going to bed. It's very, very seldom that I'm not in bed and asleep by eight o'clock."

This "nervous wreck" had had eight hours of sound sleep before her "insomnia" began to torture her!

One of the commonest, if not the commonest, single cause of restlessness at night is an insufficient amount of exercise in the open air during the day. Sleep is far more a matter of the muscles than of the brain; and if you work during the day entirely with the latter, the chances are decidedly in favor of some angle or corner of it lying awake, either to dream, or to bother you with hard-luck stories in the morning. Get yourself thoroughly and comfortably tired at some form of pleasant exercise in the open air — walking, riding, ball-playing, tennis, rowing, fishing, gardening, dancing, automobiling — no matter what, so long as it keeps you interested, under the open sky; and you have pretty nearly insured a fair night's rest.

The next commonest cause is lack of drafts in the bedroom. I say *drafts* advisedly, for the only air really fit to breathe is air which is in motion; and every bedroom should be so arranged that a steady current of air flows through it gently all night long. It won't hurt you a particle to lie right in that current, simply putting on blankets in proportion to its coolness or coldness.

The ideal place to sleep is on a porch, or a roof; and the bedroom of the future will consist of a good-sized sleeping-porch, sheltered by curtains which can be drawn on the stormy side, with a small dressing-room attached to it. This, even in our northern climate, can

be slept in, not merely without discomfort, but with actual delight, three hundred and thirty nights out of the year.

Another thing to be avoided by those inclined to sleeplessness is going to bed with too empty a stomach. The popular prejudice against going to bed on a full stomach appears to have surprisingly little rational foundation. Children, the sweetness of whose sleep is proverbial, almost habitually fall asleep over their suppers; and animals and savages lie down and snore the clock round, directly after not merely a full meal, but, in the language of the mining-camps, a "puffick gorge." When more than four or five hours have elapsed since dinner or supper, it is often helpful to take a handful of crackers, a glass of milk, or a cup of oyster soup, or beef tea just before retiring, if you are inclined to be restless.

In the sweat of thy brow shalt thou earn sleep, to paraphrase Scripture, and a good, free perspiration honestly earned and produced is the best known hypnotic. For those who are too lazy, or whose duties are too confining, to allow them to get this, a hot bath just before retiring will prove helpful. But it is a poor substitute for the real thing; and on general principles, it is a hard thing to keep healthy without at least one good sweat every day. If the weather happens to be hot, a cool bath just before retiring will be a great help toward a restful night, because of its soothing effect upon the nervous system.

When you actually find yourself sleepless, the best thing to do, at that particular time, is *nothing whatever;*

and the more thoroughly and completely you do it, the better. Just make up your mind what you are going to do next day to prevent a repetition to-morrow night, and resign yourself to the situation. Remember, it won't do you the slightest harm in the world to lie awake in a comfortable bed, in a well-ventilated room, for one, two, or even three hours at a stretch, provided you keep your muscles quiet and your mind at rest.

If your mind wants to think, let it. It won't do you any harm, and there are few of us who do too much of that useful process during our waking hours. Just try to turn it into interesting, profitable, and entertaining directions. The man or woman who cannot enjoy a couple of hours with his or her own thoughts has sadly wasted his opportunities.

If your thoughts want to tear all over the known world, don't try to stop them; the farther and faster they travel, the sooner they will tire themselves out. If you can only forget that you are awake, you will be asleep before you know it. If you are thirsty go and get a drink; if the room has become stuffy, throw the windows wider open; if your feet have become cold in any way, do whatever is necessary to get them warm. But beyond this, avoid anything which lifts your head from its pillow. One of my colleagues — a man of wide experience and national reputation — used to say to his patients who complained of sleeplessness: —

"Lie quietly in bed in good air all night long, and I don't care whether you get to sleep at all or not."

Anything which concentrates your attention upon the fact that you are awake and sleepless simply makes

matters worse. This is particularly true of such hoary old humbugs as repeating the multiplication-table up to twelve times twelve, or counting imaginary sheep jumping through a hypothetical gap. Any individual who can be allowed at large without a guardian can find some more interesting and profitable occupation for his wakeful hours than these infantilities. Instead of putting you to sleep, they merely convince you, beyond possibility of doubt, that you are widely and hopelessly awake.

It is not best, even for those who are inclined to be poor sleepers, to be too fussy and particular about absolute freedom from noise and absolute absence of light from their bedrooms. In fact, attempts to darken a room by means of blinds and curtains, render it difficult to ventilate properly. Make up your mind that you are going to sleep with every window in your room open, and every blind run up to the top, and you will find that you will get more hours of sleep, and far more benefit from the hours that you do get, than by stifling yourself behind pulled-down blinds and drawn curtains.

As a matter of fact, most of us sleep quite as well in a room which is simply as dark as the night without, and where, as occurs everywhere except in the remotest depths of the country, there is a certain amount of moderate noise going on perpetually, as we could do in chambers as dark as a cave and as still as the tomb. If you find that the starlight, or moonlight, or even the rays of a street lamp coming through your window, annoy you, don't fuss about the light, but take an hour more exercise next day.

As for drugs to produce sleep, they can only be mentioned to be utterly condemned. First, because, even at their best, they merely smother a symptom without doing anything to relieve its cause; and second, because, without exception, all that have any real effect are narcotic poisons, and dangerous ones at that.

The only drugs which will produce sleep without doing harm are such drugs as may relieve pain or remove the cause of the sleeplessness. Except in case of acute pain, or organic disease, the causes of sleeplessness are far better removed by exercise, bathing, fresh air, and change of scene or occupation, than by any drugs.

It is hardly too much to say that those who suffer from insomnia suffer more from the way in which they worry over their sleeplessness, and from the drugs they take to relieve it, than from the actual loss of sleep.

Every one of the much-vaunted and much-advertised "harmless" hypnotics, or sleep-producers, belongs to the great methane group, of which chloroform and chloral are the best-known members. Like all narcotics, as the system becomes habituated to them, the dose must be increased in order to produce the effect. Though relatively harmless in small doses, they create a craving, and there is great danger that sooner or later a dangerously large dose will be reached.

The habitual chloral-taker often ends by taking a dose from which he never wakes up. Emphatically, the remedy is worse than the disease!

The insomniac often suffers from a sort of unfortu-

nate split in his consciousness, by which one little corner of his mind stays awake to see whether the rest of it is asleep or not.

It goes without saying, that the chronic insomniac really is definitely and physically ill; that this annoying dissociation of consciousness would not take place in a perfectly normal individual under ideal surroundings. The encouraging thing is that he is not nearly so sick as he thinks he is. In fact, with the exception of a few unfortunate cases already referred to, in which insomnia is one of the earlier symptoms of organic brain, or mental, disease, which scarcely form one per cent of all cases, the average sufferer from insomnia will either recover within a few weeks, when the disturbing physical or mental cause is removed, or mitigated; or will go on suffering from occasional restless nights for twenty, thirty, or fifty years without being a hair the worse for it. Certain forms of insomnia, in fact, are like sick headache, neurasthenia and certain mild types of asthma — a sort of advance guarantee of a long and active, if somewhat checkered and storm-tossed, life. The highest mortality from insomnia occurs not in the victims themselves, but in the members of their family — and their physicians.

This curious habit of sleeping, as it were, in sections, while usually the result of a morbid condition of body or nerves, may be acquired by persistent effort by perfectly normal individuals. Several physiologists and psychologists who were engaged in a careful investigation of the nature of sleep, found by experiments upon themselves that they could so divide their

consciousness as to be able literally to watch themselves going to sleep, remaining perfectly conscious of the fact that their eyes were closed, that they were breathing deeply, that their muscles had relaxed, and even that they were beginning to dream, for as much as twenty, or thirty minutes at a stretch; during which time they were able to wake themselves up at will.

To put it broadly, the vast majority of all cases of insomnia are merely temporary disturbances due to some disorder of body, or distress of mind, and will disappear when their cause has been removed or the system has become adjusted to the new situation. A moderate minority, and these far the most troublesome and persistent cases, are due to some unfavorable condition of mind or body acting upon a nervous system already predisposed to these curious dislocations and other forms of disturbance. This form of insomnia, for instance, is very apt to run in families and to occur in those already of the so-called *neurotic*, or nervous type. It is a troublesome condition in the sense of being difficult to completely check, and apt to recur; but it has the encouraging side of seldom being as bad as it appears to be, of being able to last for a long period without seriously injuring the health of the victim, and of usually, in the long run, gradually subsiding, or becoming so mild as to cause little further distress either bodily or mental. Lastly, a very small fraction of all cases are the early signs of serious nervous or mental disease.

Now supposing you are troubled with sleeplessness, what is your plan of campaign? The first thing to be

borne clearly in mind is that the really important thing is not the restlessness, or the loss of sleep, but the condition or influence *that causes it*. Look for this cause and if it be a temporary or comparatively trivial one, — as it will be in nine cases out of ten, — remove that, and your sleeplessness will disappear like magic. Remember, the more you attempt to treat the sleeplessness directly, the worse it will get; and the sooner some corner or other of your mind will get into the bad habit of sitting up at night to listen to the clock strike, and then telling you about it in the morning. Go over yourself and habits thoroughly and conscientiously, and in the light of your best judgment, make up your mind what you are doing that you ought not to do, or leaving undone which you ought to have done; then proceed to reform yourself. If this fails, go to your doctor and have him go over you thoroughly and give you the benefit of his judgment.

CHAPTER XVIII

IMAGINARY DISEASES AND THEIR INVENTORS

WE have all smiled scores of times in a superior and pitying way at the imaginary invalid, the individual who enjoys ill health and revels in symptoms. Of course, we should never be so foolish, and we wonder how any one in his senses can ever desire to imagine himself sick when he is well, or take pleasure in exaggerating his symptoms if he is ill. And yet we all do it at one time or another.

Self-pity is one of the greatest luxuries on earth, and there are few enjoyments keener than inducing others to share it with us. Even those hard-faced and stoical individuals who make it their boast that they never complain, that nobody ever heard them whimper even when they were half dead, as a matter of fact, are the biggest humbugs of the whole lot, and are inviting sympathy by the very vigor of their protestations that they never need any and would n't take it if it were offered.

We have an astonishing capacity for harmless and consoling little self-delusions. We can live threescore years and ten on this planet and yet carry to our graves intact the pleasing belief, down in our heart of hearts, that we really are a little different from anybody else that walks upon the face of the earth; and probably, if we were perfectly frank, we should admit with re-

luctance that the clay which was used in our making was a little finer quality of alumino-silicic oxide than that used for the ruck of humanity. Moreover, nobody else has quite so handsome a wife or such brilliant children or so fast a horse or so good a well. And naturally, when we are sick, no one else suffers quite as we do or can appreciate the tortures that we are undergoing, even though we give no sign.

For the most part, this robust and romantic self-love is perfectly harmless, and one of the greatest and most constant sources of pleasure in life — a truly golden delusion. But, when it comes to its activities in illness, then it turns upon its creator and exaggerates the very sufferings which it is endeavoring to soothe. Not that it does any particular harm, except in a subjective way; for its effects, like its origin, are purely mental, and it can neither make a real disease any worse, nor can it under any circumstances originate a disease where none existed.

The imagination may magnify the sufferings of a particular illness and increase the length of time that the victim will imagine himself or herself sick, and it can, of course, inflict frightful amounts of discomfort and distress upon the members of their families, but it seldom or never goes beyond this. One can no more imagine himself into a serious illness than he can, by taking thought, add a cubit to his stature.

One consideration should always be allowed to temper either our mirth or our indignation in dealing with these poor *malades imaginaires;* and that is, that every one of them *really is sick*, if only ever so little. They

may not be one tenth so sick as they think they are, and their disease may be as different as the poles from that which they are proud to boast it is, but they actually are diseased in some respect or they would neither invent nor persist in these singular delusions.

To say that they are "merely hysterical" does not help the matter in the least in the direction of explanation; for we are utterly in the dark as to what hysteria means, except that it is a group of symptoms that *never appear in a perfectly healthy individual.*

Many of these conditions can actually be recognized as mild forms of mental disturbance. Such, for instance, were the patient invalids and pious sufferers who filled the Sunday-school literature and the books of devotion of a bygone generation. Their principal defect was a boundless self-esteem bordering upon megalomania, accompanied by a placid indifference to the suffering and discomfort that they might inflict upon others.

I well remember in the early days of my practice one good mother of this type, who had developed at about forty years of age a mysterious and incurable spinal complaint. This gradually crippled her inch by inch, inflicting excruciating tortures, her irrepressible groans of anguish under which could be heard half a mile away, until, finally, she became unable to move hand or foot and was confined to her room for six years.

Her piety was most exemplary. Being unable to attend the public means of grace, special sessions and prayer meetings were held regularly in her room, and she was looked upon as one of the pillars of the church.

One of the most agonizing symptoms of her disease was that, while it left her comparatively free from pain during the day, it invariably woke up toward evening and caused her to suffer the tortures of the damned all night. The only relief that she could obtain, and that of a most trivially partial character, came from being rubbed incessantly, for hours at a stretch, by her husband or daughters, one of whom had to be in constant attendance upon her nearly all night long. Enthusiastic revivalists had attempted time after time to heal her by prayer, but their efforts were unsuccessful. Satan was too strong for them. She must be tortured to show the power of sustaining grace.

One day the nearest neighbor, a quarter of a mile away, was astonished to see this hopeless paralytic rush wildly into his house, exclaiming, "Hurry, Mr. Johnson; our house is on fire!"

It appeared that during the absence of all the rest of the family some clothing left to dry near the kitchen stove had caught fire, and when the helpless invalid smelled the smoke and saw the flames come rushing up the stairway, she jumped out of the window on to the porch roof and slid down one of the pillars. Needless to say, her cure was permanent. She never could fool that family or that neighborhood any more.

It afterward turned out that at such intervals of the night-watches as she was not requiring rubbing by some member of her family, she had been in the habit of perambulating about the house, helping herself to what she wanted in the pantry, and had even started the report of "hants" in the house to account for some

mysterious noises which excited the curiosity of the family.

It may be mentioned in passing that it has become an axiomatic rule with physicians for some years past, whenever a report of a certain house being haunted is started, to look for some hysterical girl or imaginary invalid in the family. They are the real Women in White, the sheeted figures that come sweeping along dark passageways at gruesome hours of the night.

But the things that people will invent about themselves in their excess of self-pity and self-sympathy! The popular impression that imaginary diseases are chiefly products of the higher civilization and confined to the wealthier classes who have leisure to be sick — those who suffer, as they say of the tourists in California, from "nervous prosperity" — is entirely mistaken.

The most persistent and grotesque morbid fancies are to be found among the poorest and most ignorant. Nothing, for instance, is commoner in the bog districts of Ireland than for a great, strapping Biddy Muldoon to come into your office with the solemn statement that she has "a shnake in the inside of her." She will even tell you exactly how she happened to swallow it: namely, by falling asleep under a tree in the harvest field with her mouth open. If you doubt her diagnosis, she promptly informs you that she can feel it squirming, and that she has to eat twice as much as she did before, one portion for herself and the other for the snake.

A similar delusion is exceedingly common in the London slums, only there, instead of a snake, it is some mysterious jabberwock of a beast known as a "tiger."

This is not so utterly irrational and incomprehensible as one might at first sight imagine; for all of these poor people, on account of the coarseness and, often, badness of the food which they are obliged to thrust down to satisfy the cravings of hunger, suffer frightfully from attacks of burning acid dyspepsia; and the burning, griping pains which occur in the course of it are not at all unlike such as might be produced by the claws or teeth of some carnivorous boojum which had been swallowed. Of course, the writhings of the snake are merely the abnormal contractions and twistings of the intestines.

I have met with only one of these "dragons" on this side of the Atlantic, but that is vividly impressed upon my memory. I received one afternoon an urgent call to go to such and such a number to see a woman who was "awful sick." Arrived there, I found a rather intelligent-looking young woman in a state of wild excitement, verging upon nervous collapse.

"Oh, doctor, I have got a snake in my stomach! Can you get it out without killing me?"

"How do you know it is there?" was my question.

"Oh, I just saw the head of it about twenty minutes ago!"

I assured her that I was death on snakes, gave her an emergency dose that I knew would not do any particular harm in any case, and she became calm enough to tell me her story.

The earlier symptoms were clear enough, but I could make neither head nor tail of the snake's head episode, but thought, just to satisfy her and to get a circumstantial statement as to exactly where she had seen the snake's head, that I would look at her throat. I got her in front of the window, focused my mirror upon her throat, and behold, the mystery was solved.

She had a perfectly enormous pair of tonsils, one of which was crammed to the bursting-point with those accumulations of cheesy matter which form in the little spongy cavities or crypts of the gland. These seldom attain a size larger than about that of a grain of wheat and then drop into the throat, are coughed up, and give an exceedingly disagreeable taste and odor if they are crushed. In her case, however, some of them had grown to the size of small marbles, and one of the largest of them had evidently just dropped out into the throat, leaving a hollow which had been occupied by it, into which I could easily have thrust the end of a cigar. I asked her the color of the head of the snake, and she replied: "A kind of gashly yallerish white," which, of course, was precisely the tint of the cheesy nodule.

I knew that it was useless to argue against her delusion, so simply told her that the medicine that I would give her would not only kill the snake, but dissolve it so that she would never see or hear anything more of it or its remains. It did, and she was perfectly delighted with her cure and my skill.

It may be said in passing that the widespread popular belief in worms as a cause of disease is a survival of the

snake delusion, though it has an apology for a basis in fact, in that several forms of Cestodes, Nematodes, and Tæniæ do occasionally inhabit the human alimentary canal. They are, however, comparatively rare, and even when present give rise to no disturbance whatever of the general health in nine cases out of ten. The tapeworm specialist belongs with the magician, the fortune-teller and other Nature-fakers, and he is rapidly losing his hold as rational medicine spreads and the wise woman and the seventh son of a seventh son recede. As an illustration of the actual rarity of tapeworms, it may be mentioned that nearly all these "worm doctors" or manufacturers of vermifuges have a standing offer of good round thumping sums for the discovery and handing over of a planarian of really dramatic and effective proportions, which can be exhibited as "taken" by their remedies.

Then there is that large and interesting group of pseudo-sufferers who not merely imagine themselves to be ill but produce the symptoms which may be required to make others share their belief.

Many and many a young doctor has been puzzled almost to distraction by a skin eruption which steadily spread over the body in spite of everything that he could do to cure it, to suddenly have the mystery solved one day by a nurse or some member of the family discovering the patient painting croton oil or some other irritant over the surface in the direction that he wanted it to spread.

One of my colleagues during his interneship in a large Eastern hospital had a most singular case of this

description. A young girl was brought in suffering from an opening or sinus in her arm about six inches below the elbow, from which both matter and pieces of bone kept discharging. It was carefully washed out with antiseptics, scraped and closed, but next morning was found open again, and a day or two later out came another piece of bone. The sinus kept burrowing up the arm until, finally, it had passed the elbow and started up the upper arm.

Now a bone sinus which travels up and past a joint without involving the cavity of that joint is an excessively *rara avis*, so a careful watch was set. That the pieces of bone came from the sinus there could be no doubt, as they were repeatedly washed out in syringing and cleansing it.

But one day the girl was detected by the nurse carefully cutting off the little bits of bone which were found by her in her breakfast bacon and slipping them under her pillow. The hint was enough. All her bacon and every other kind of meat was carefully cleared of every possible scrap or trace of bone before it was given to her, and the discharge of bone stopped absolutely. Then pieces of bacon were given with the little fragments of bone marked or stained in some peculiar way, and these were promptly recovered from the sinus. And yet, when that patient was confronted with her treachery, she not only refused to confess but roundly abused both nurse and doctors, and stormed out of the hospital in a fury of rage.

Another performer of this class who is most familiar in the experience of the profession is the woman who

has an artificial temperature. A patient will be under your care for some nervous or mild chronic disorder. About the time that she should be beginning to get better, and, consequently, is not receiving quite as much anxious attention and sympathy as she did in the beginning, a new card must be played to hold the centre of the stage, and up goes her temperature to one hundred and three and one hundred and four, or even one hundred and six degrees. You gasp with dismay. Here is a septic complication somewhere which you have totally overlooked. A most searching examination, however, fails to discover anything whatever amiss apart from the astonishing temperature. But the patient is handled and waited on as if she were Sèvres china for two or three days, and her temperature goes down again.

No sooner does interest in the case begin to slacken again than the fever thermometer does another mountain-climbing stunt. Again an examination shows nothing amiss, and you begin to be suspicious.

A little investigation shows either that the patient has taken her own temperature and then shown the thermometer registering that torrid degree, or else that she has sent the nurse out of the room on some pretext or another while the thermometer is still in her mouth. Further investigation elicits the fact that she has just called for a cup of tea, or has had her breakfast brought in, or has had the hot-water bottle refilled, within ten or fifteen minutes of the temperature-taking. Fever thermometers, it should be explained, are usually self-registering, and the mercury will remain at any tem-

perature to which it has been raised until it is shaken down again.

The ingenuity of the ruses to which these temperature raisers will resort is almost incredible. Some of them continue to puzzle us even to the last, by having developed some curious trick of twirling a thermometer rapidly under the tongue, or rubbing it vigorously in the blanket, or chafing it between the palms of the hands in such a way as to raise the temperature by friction; so that several of these cases have actually been seriously reported in medical journals as having a faculty of raising their temperature to any desired pitch at any time they wanted to.

It would hardly seem possible that there could be such a thing as a fashion in disease, which people have sufficient control over their symptoms to follow. Yet almost any physician of experience will have a score of patients in a given period or season who will come into his office, firmly convinced that they are all suffering from the same malady. The phenomenon of course is a purely psychic one, and yet like all such, it has a physical basis, and is one which is full of interest, as throwing light upon some of the obscurest problems in medicine, the relation between mind and body in disease.

The first thing to be frankly premised about these followers of pathological fashions, is that the overwhelming majority of them really have something the matter with them. Popular impression to the contrary notwithstanding, it is a distinctly rare occurrence for a perfectly or even reasonably healthy man or woman to

imagine themselves sick. In one sense, there is no such thing as an imaginary disease.

An imaginary disease is usually a perfectly definite result of a real abnormal condition, poisoned nerves, starved or over-gorged stomach, under-ventilated lungs, overworked muscles, or under-rested brain cells.

Most of the delusions under which imaginary invalids labor, instead of being, as is popularly supposed, "made up out of their own heads," are really on the order of mild deliriums, hallucinations like the deliriums, the nightmares and the grisly dreams of fever. Once let something go wrong in the body chemistry, or in the mechanism of immunity to the toxins of mild infections, and the nerves fed by and bathed in poisoned blood promptly begin to build those images of suffering and disaster known as "diseases of the imagination."

The chief work of the imagination in disease lies in the explanations which it furnishes of those vague, but genuine, sensations of discomfort, — those headaches, eye-aches, backaches; those sensations of dizziness, of suffocation, of bursting with gas; the sensations of sinking, of causeless fatigue and apathy; and second, in the picture which it constructs out of these materials. Here its prowess is simply boundless, and its power of leaping to conclusions equal to that of the deathless cow that jumped over the moon.

These "neurotics" always have a proper pride about them. They are seldom satisfied with anything short of the very deadliest and most dramatic of diseases, and if they can only hear of a particularly rare and interesting malady, that is the one which they promptly

decide they have. Usually the physical basis is pathetically and almost ludicrously apparent. Those who suffer from acid dyspepsia, with its often really distressing cutting and burning sensations in the stomach, are quite sure that they have cancer, and though they express themselves as relieved, are often in their heart of hearts, disappointed, when you assure them that there is no basis for their fears.

Those who have palpitation, from the upward pressure of a gas-distended stomach, pushing the diaphragm against the heart, are quite sure that they have a serious form of organic heart disease, and are marked for a dramatic and sudden death. Those who have the little sensations of numbness, and tingling in the legs and arms, which are frequently associated with a poor circulation, or with blood overloaded with waste products, are equally certain that these are the early signs of paralysis, and that they will soon be palsied and helpless; and so on all along the line.

Here is where the quack and the patent medicine man reap their harvest. These poor people know that they are suffering, but without knowing why, and are eagerly groping about for an explanation. Along comes the skillful advertiser, with his familiar questions: —

"Do you feel disinclined to get up in the morning?"

"Have you a weak back?"

"Do you wake with a dark brown taste in your mouth?"

"Are you subject to headaches?"

"Have you a sense of fullness after meals?"

And so on, — a fiendishly ingenious *mélange* of the general commoner symptoms of the neurotic, combined with sensations which a perfectly healthy individual can discover in himself at any time if he begins to think about them, or, as Mrs. Lecks expressed it, "to live in his own insides."

The neurotic reads the list of symptoms with open mouth and growing conviction, and the final triumphant conclusion, "Then you have kidney disease, and Pond-Weed Bitters will cure you," is accepted as gospel.

The other touch which "gives to these airy nothings a local habitation and a name," is the hearing or the reading of dramatic or striking cases of some particular disease. This last influence is what usually gives us our runs of fashions in disease. Often the connection is absurdly easy to trace. Given an operation or death from, say appendicitis, or cancer, in some prominent person in the community, and you are nearly safe to see within the next ten days from two to a dozen patients — according to the size of your practice, who are convinced that they are suffering from one or the other of these diseases. Older physicians have told me of the scores of cases of women who used to come into their consulting rooms during the last illness of General Grant, firmly convinced that they were developing cancer of the tongue or throat, a form of the disease which is almost unknown in women.

Twenty to thirty years ago, when the ponds and sloughs and swamps had not been drained, and mosquitoes and malaria were abundant, all these vague

symptoms were put down to "mylary," and patients dosed themselves until their heads rang with quinine, before they even consulted a physician.

Similarly in epidemics of influenza, every group of sensations of discomfort and ill-health of which the patient does not know the cause, is promptly put down as "the grippe," and your waiting-rooms are filled with patients who come to you with a ready-made diagnosis, and simply want a prescription for what you "give for the grip." Half of them perhaps really have it. The remainder are simply following the fashion.

Some of the most ludicrous of these manufactured diagnoses are those that are made by the family of the patient. I recall one particularly bizarre illustration in the case of an old colored man who had had a stroke of paralysis. This had happened to occur during a severe thunderstorm, and nothing would persuade the family first of all, that he had not been struck by lightning, although there was not a particle of evidence that an electric current had passed anywhere near him, — merely that he was found unconscious after the storm was over. But my skepticism as to their explanation of his condition appeared to have unsettled their minds as to both diagnoses, and they were greatly exercised about the matter. Finally, however, about the fourth day, his son came into my office with a triumphant grin all over his countenance and greeted me: —

"Doctah, we's foun' out what's de mattah wid de ole man now. He's done got his speech back now, an' he talks of nuttin' but ribbers an' lakes an' cataracks. So we all reckon he's got *wattah on de brain!*"

This sort of misinterpretation will of course account completely for those cases of imagined cancer, appendicitis, paralysis, etc., in which there has already been pain or a twitching in the region supposed to be diseased, but the power of imagination goes even farther than this. It will actually produce sensations, not merely of discomfort, but of acute pain in regions in which the ulcer, cancer, or other mortal malady is supposed to exist.

And this throws a light upon one of the most puzzling and singular powers of the human mind over the body. It is of course in large part illusion, and yet there is a definite physical basis for it, not merely in pathology and psychology, but actually in anatomy. Pain is, of course, a purely subjective symptom, and is felt in the gray matter of the cortex of the brain. By the curious method of construction of our nervous system, unpleasant impressions which are made upon the area in this cortex which controls a certain region of the body, are interpreted by the mind as pain in that particular region or organ. So that, given an abnormal condition of the general nervous system, a very slight attack of real pain in a particular region or organ will throw its centre in the cortex into such a state of disturbance as to keep up after-waves, or so to speak, echoes of pain, for an almost indefinite period afterward, particularly if attention is kept continually and expectantly concentrated on this particular region and pain.

Nearly all these sufferers have a certain amount of neuralgic or other pain in the region or organ com-

plained of, to begin with as a basis, and after a little time they become positively incapable of distinguishing between the pain which they actually are now, or may not be, suffering, and the memory of the pain which they were suffering twenty or thirty minutes or even two or three hours before. Not only so, but as has already been intimated, if a sufficiently vivid mental impression, such as would be produced by reading of or seeing the agonies of a case, say of appendicitis, be made upon this centre in the brain it is not difficult in susceptible individuals, to make them begin to refer this disturbance to the region of the body which this centre controls. For instance, I have actually known young surgeons who confessed to me that after seeing their first death from appendicitis, they were conscious of a burning pain down in the "appendix" region, in their own right groin for several days afterwards, and were half in fear that they were actually coming down themselves with an attack of appendicitis.

Another physical fact which makes it easy to deceive ourselves, even quite unconsciously, is that nearly all our pain is what the physiologists call "referred." That is to say, we feel it in a certain area of the brain, and because the nerves running to that area of the brain come from a particular part of the body, we refer the pain to that part of the body. If we were to pick up the sensory nerve, say from the thumb, and that from the little finger, cut them across and graft the severed end of one into the cut end of the other so as to cross the sensations, any pain then experienced in the thumb would be promptly referred to, or as we would say,

felt in, the little finger or vice versa. Nay, this "crossed" condition occurs even in the normal body.

The great internal organs, like the heart, the liver, the intestines, etc., have no direct connection with the brain, but switch in as it were on the cable lines connecting the surface of the body through the spinal cord with the brain. In an attack of acute and intensely localized inflammation like appendicitis, for instance, the pain or sensations giving rise to the pain are transmitted through the sympathetic nervous system to the spinal cord, where it switches in on to the line of the ordinary sensory nerve running from the skin of the surface of the abdomen covering the part. Consequently, the pain is referred to the area of distribution in the skin of this particular nerve. Oddly enough, in the case of appendicitis, it is often referred two to four inches above the actual seat of the inflammation.

A careful mapping out of the surface of the abdomen shows that inflammation in a certain organ will produce pain and tenderness on pressure on the surface of the body over that organ but from one to three inches above or below its precise location. So that, to put it roughly, when our nervous system gets sufficiently poisoned or otherwise put out of gear, it is practically impossible to say what pain we suffer or where it comes from with any degree of accuracy, and the possibilities of self-deception are simply limitless.

Upon this strange "reference" fact are based the curious impressions which individuals, who have lost a limb, will get as to what is going on in the fingers or toes of the limb which has been cut off. Ask any one who

has had a limb amputated, and they will tell you that for weeks and months afterwards, they were conscious of itching or tickling sensations in the toes or fingers of the limb that had been cut off and had to look down to the stump to actually assure themselves that it was gone. This seems almost incredible, but can be verified by asking the question of any one-armed or one-legged man that you happen to know.

The explanation is simple. In the stump of the arm or limb lies, of course, the nerve trunk. This was cut squarely across in the process of amputation, and in so doing, the whole bundle of fibres, each of which led from some particular area of the limb below, was left exposed, as would be the cut ends in the wires in a main line telephone cable. Whenever in the course of healing or in the process of suppuration in the stump, one of these cut fibres happened to be irritated or stimulated, it sent an impression to the brain, and that was promptly translated as having come from the thumb, little finger, or palm which that nerve trunk formerly supplied.

Men may often have a limb amputated under chloroform and not know for days afterwards that this has been done. A poor fellow one day came into the hospital in which I was an interne, with a large tumor on the lower third of the thigh bone. It was carefully examined, a consultation of the staff held, and the patient told that it was probably a form of bone cancer, (sarcoma), and that the only thing to do was to cut down upon the tumor, and if it were found to be cancerous, to remove the limb in order to save his life. If

it were not cancerous, it would be sufficient simply to remove the tumor.

He consented to this advice and was put under ether with the understanding, that if it were possible to remove the tumor without taking the limb, this would be done. If not, the limb would be amputated. The tumor was found a sarcoma of the most malignant type, and the limb was amputated about the middle of the thigh. The patient was in feeble condition before the operation, lost a great deal of blood, and the cutting through of a great bone like the femur is always a serious shock; so that his condition was considered decidedly critical. To our astonishment, the first thing that he said on coming out from under the ether was, "I am so glad you did n't have to take that leg off." The nurse gasped, but wisely held her tongue, and it was decided not to undeceive him until he had begun to regain his strength and was considered out of danger.

For five days that patient lay there in bed unconscious that his limb was gone. The cut end, of course, of the great sciatic nerve was continually sending messages to his brain, which he had interpreted as coming from knees, ankles, and toes. At the end of that time, he had rallied sufficiently, we judged, to bear the shock, and he was told. And we had to lift the bedclothes and show him the stump before we could make him believe it. He was, however, strong enough to stand the shock of the disappointment and made a rapid and uninterrupted recovery.

Another case illustrating this same singular ana-

tomical fact was that of a poor old Irishman whose hand I was obliged to amputate just about the middle of the fore arm, on account of an intractable disease of the bones of the hand and wrist, which was causing blood poisoning and threatening his life. The amputation was, of course, done only as a last resort after the disease had resisted every imaginable form of local treatment. And the old fellow very pluckily asked us after the hand was taken off, to keep it long enough to make a thorough examination so as to find out exactly what had been the matter. Then after this, of course, he wanted to have it buried where it could be got at and laid with him in his coffin. For, as is very common with the more ignorant class of European immigrants, they don't like to be buried with any of their limbs or organs gone for fear that these will fail to turn up in the resurrection. And I, accordingly, took the hand and portion of arm down to my office after the operation.

Next morning, when I went into his room, the old man was very much better. His fever had gone down, he had almost no pain, and he was greatly delighted to be rid of his diseased hand. There was only one mote in his sunbeam, and that was that "that there hand of mine hez been dropped into that jar of alcohol all kind of doubled back on itself. I've been feelin' it crampin' that way all night. Doc, you jest did n't notice it when you put it in, but when you go back to the office, I jest wish you'd take it out and straighten it."

This I readily promised, first taking care to elicit

from him the precise position in which he believed the hand and wrist to be cramped, which was, perhaps naturally enough, with the fingers doubled backward and the wrist bent in the same direction.

As soon as I got down to the office, I went to the jar containing the specimen, and there discovered, much to my amusement, that the hand was in exactly the opposite position, namely, closed and flexed upon itself, with the wrist bent in that direction. I left it exactly as it was and went on about my work.

That evening I could not resist the temptation of dropping in to find out the result. The old man greeted me with a radiant smile. "It's all right now, Doc." "About five minutes after you got down to the office — I timed you, I knew you were going right down — that kink straightened right out and I have n't had a bit of trouble with it since."

It would have been cruel to undeceive him. And I have no doubt he is still relating this remarkable incident of telepathy between himself and his severed hand to admiring grandchildren. With such traitors as this within the camp, with our nerve-wires carrying misleading messages, is it any wonder that our Oriental imaginations can construct out of almost any group of uncomfortable sensations, a simulacrum of any disease which we read or hear about with sufficient vividness and impressiveness.

The *malade imaginaire* who is able, in the graphic language of the street, "to throw a fit," or go into a faint or develop an agonizing sick headache whenever she needs a little additional sympathy or dramatic

assistance in getting her own way, is, of course, a type as painfully familiar to the laity as it is to the profession.

The psychology of these self-made invalids is exceedingly curious and interesting, and yet simpler and more explicable than would appear at first sight. It is really unjust to them to say that it is entirely or even in large degree intentional. In fact, in the beginning, their sufferings are just as real to them as if they were in deadly peril of their lives, and even throughout the entire course of their disease, they often succeed in deluding themselves as completely as they do their families and friends.

The basal motive underlying the whole singular drama is a longing for sympathy, the desire to attract attention and to hold the interest of some individual or group of individuals. This impulse, of course, is common to us all and is a perfectly natural and wholesome one, provided that proper means are taken to gratify it.

Those of us that are fortunate enough to have talents of some sort or description, conversational, musical, financial, artistic, are able to make ourselves interesting to our friends and acquaintances by these means; and we are just as touchy and as fussy over any little slight, real or imaginary, upon such little reputation as we may pride ourselves upon in any of these regards, as the *malade imaginaire* is about lack of adequate sympathy with her sufferings. But there are, unfortunately, a large majority of us who are almost utterly destitute of any of these little graces and ac-

complishments and who find it difficult to retain much more than a mere polite tolerance of our existence on the part of our acquaintances and perhaps even of our family.

There is just one card, however, which we can all of us play at any time and invariably with trump effect, and that is, to fall sick. We are given a place in the limelight at once and overwhelmed with sympathy and offers of assistance and anxious inquiries after our condition. Is it any wonder that persons who are either destitute of any special gifts or too lazy to exert those they have, should attempt to repeat this delightful rush of sympathy and interest as often as their consciences will admit, and where they happen to be lacking in proper control, to gradually form a more or less constant habit of it.

The singular claim which sickness and suffering makes upon our sympathies is, of course, one of the main reasons why in certain circles the two topics which are invariably sure to elicit an animated and interesting discussion are symptoms and hired girls.

There can be no question that the scheme works gorgeously, especially upon the crude and unsuspecting male. I have seldom known a hysterical married woman whose husband did not think that the sun fairly rose and set in her. And it is a matter of common experience with physicians that the greatest difficulty in bracing these patients up and getting them to behave like rational beings lies not so much with them as in their immediate family, who believe in the reality of

their symptoms even more devoutly than they do themselves.

The popular impression that these manifestations are confined to the gentler sex is far from correct. Any physician of experience can recall scores of hypochondriacs, imaginaires, and even of straight-out cases of hysteria among men. And these are among the most troublesome and intractable cases of this class that we have to deal with. Indeed, if we include, in this class, as in the majority of instances it is really just to do, the man who is fussy about the precise texture of his bread and the exact temperature of his coffee and the dryness or dampness of his sheets, who is afraid of a draft, or thinks he will catch his death of cold if he gets his feet wet, and that the heavens will fall if his dinner is five minutes late, or if he has to sit up half an hour beyond his usual bedtime, the numbers in the two sexes will pretty nearly strike a balance.

Women, in spite of their sensitiveness and fastidiousness about some matters, have a singularly robust indifference to a number of trivial little details of imaginary hygienic importance which weigh heavily upon a certain type of precise and particular masculine minds. And, of course, when men once really are sick, they are notoriously the most unreasonable and fractious and unmanageable patients that we have anything to do with. Either there is nothing whatever the matter with them, and the doctor and their families are silly alarmists who are in league to keep them in bed when nothing is the matter, or else they are a great deal worse than the doctor will admit they are

and are sure that those around them are concealing the truth from them for fear it would frighten and discourage them to know the worst. Some of the fussiest and most whimsical patients I have ever had to do with have been men, and almost any physician of experience will corroborate my statement.

One in particular I remember, a cultured, wealthy old Easterner, who, on a trip through the West, was seized with a mild attack of pneumonia. Although the disease ran the mildest possible course and rapidly terminated in complete recovery, he insisted upon regarding himself throughout the entire ten days as having one foot in the grave and the toenails of the other digging hard into the turf.

His particular dread was lest he should become chilled, especially as the very comfortable room in which he happened to be, was heated by a stove instead of a steam radiator. One morning when I came to his bedside, I was astonished to have him put out his hand encased in a wool-lined and fur-trimmed glove, with the remark, "You must excuse my glove, Doctor, but I am so afraid of these dreadful drafts." The next day I was hardly surprised when the nurse informed me that he had asked for a glass of water, and when she handed it to him, asked her for his glove, which he carefully drew on before he would touch the chilled surface of the glass!! If any woman could better that for whimsicality, I should like to hear from her.

Unquestionably, the larger part of these invalids are women, but this is very readily explained. First

and chiefly, in my judgment, because while illness or suffering in a woman instantly and irrepressibly excites sympathy and pity, it is not so sure to produce this effect in a man.

It has ever been the tradition of the ages to regard woman as the weaker sex and to protect and pity her and put up with her whims as being a part of the natural and necessary scheme of existence. In fact, most men rather enjoy having to do a reasonable amount of petting and consoling and humoring. But the instinctive feeling about a man who is sick is almost precisely the reverse. In the first place, unless he happens to be a near relative, you are rather annoyed, because it interferes with his efficiency and prevents him from doing something which you had relied on his doing. In the second place, unless he is obviously and visibly so ill as to be in danger of his life, both the patient and his associates are inclined to regard illness as something to be ashamed of. And even in the protoplasm of the gentler sex there is a singular kink in this same direction.

The women of his family are kindness and sympathy itself to a man when he is sick, but they don't expect him to be sick too often. It is n't manly and it is n't according to the reasonable probabilities of the situation or the rules of the game. And while genuine and serious illness will often bring out the noblest and most unselfish qualities of devotion in a wife or a daughter, chronic illness, especially of a kind that produces no very striking visible symptoms, and is apt to occur when there is something toward that the patient does

not want to do, is almost certain to excite suspicion, if not disgust, in the feminine mind.

While the majority of hysterical and nervous women are firmly believed in by their immediate families, the majority of self-made invalids and hypochondriacs among men are at least strongly suspected to be humbugs by the women of their household. So that while one sex has every encouragement to persist in its little series of spectacular effects, the other is sternly discouraged.

The other great reason is, that men for the most part are driven by the clock and the time card ; they must either be fit for duty or in bed ; there is practically no intermediate ground that is permissible, while the woman has a whole continent of hazy, half-way, shoal-water anchorages between perfect health and complete disability in which she may drift for months and even years at a stretch without ever having to definitely declare her precise latitude and longitude.

CHAPTER XIX

THE PREVENTION OF OLD AGE

EVERY process in nature is tolerable and even enjoyable when it comes — except, perhaps, birth. From the vigor with which we wrinkle up our features and squall when the light of day first strikes us in the eyes, it is generally assumed that for reasons best known to ourselves, we thoroughly disapprove both of our new surroundings and of the process which brought us hither. But this is merely assumption, and our personal recollections upon the point are of the vaguest and would hardly be accepted as evidence, even by an ex-corporation lawyer trying a Standard Oil case. Be this as it may, however, no outcries, however lusty, on our part could do adequate justice to the sufferings of the other player in the great drama of the New Life. Childbirth and the field of battle, these are the two supreme blood sacrifices of woman and of man. But we have unanimously agreed to ignore this one really disagreeable natural incident in our lives and to concentre all our anticipations of dread and terror upon the opposite end of our career when we make our exit from the stage of life.

We dread death, which ninety-nine per cent of us meet with far less outcry than we do birth, and we look forward with great misgiving and forebodings to that last act of life's drama which precedes the final falling

of the curtain, old age. Why the process of getting old, of relaxing our exhausted hold upon life, should be either difficult or painful is hard to conceive upon *a priori* grounds, and as a matter of fact we have abundant evidence from the mouths of those persons whose testimony alone is of any weight, the dying themselves, that in the phrase of the Grand Monarque, "Dying is very easy." Death is as natural and painless as the fading of a flower or the falling of a leaf, and as welcome as sleep to the weary. Is it not possible that we have allowed the shadow of this imaginary, this self-created and superstition-conjured dread of our final, peaceful exit to overcast, as unnecessarily as illogically, that stage of our life which is the most peaceful, the sunniest, and the richest in happy numbers, old age? We shall all grow old one day if we have the luck to live long enough, and any attempt to avoid this inevitable event is as rational and as manly as the flight of Frederick the Great's cuirassiers at the battle of Leuthen. The eagle eye of the great general marked their flight, and he dashed after them as hard as he could gallop, bawling in disgusted tones at the top of his voice, "Come back you scoundrels! What the —— are you running away for? Do you want to live forever?" But a healthy, honorable, natural old age is one of the happiest things that can happen to us, the crown and reward of a well-spent life, no more to be dreaded or feared than a natural death. The only pains and penalties of old age that we dread are those brought upon us by our own individual misfortunes or our follies, both of which are now largely preventable, which

the most completely so, it would be really hard to say. It is often not our follies for which we are most severely punished but certain of our so-called minor virtues. Overwork causes far more unhappiness and suffering in old age than overplay does. Old age is what we make it, both as individuals and as a community.

Where there is no way of preventing old age itself, save by the rather heroic remedy of dying earlier, which is scarcely worth while for this purpose alone, it is perfectly possible to prevent most of the limitations and cripplings, which alone make old age to be dreaded, by the exercise of our intelligence and our determination. Many, if not most, of the changes which we associate with age, which we have in mind when we think of growing old, which in our pompous, technical terminology we allude to as senile degenerations, are the result of infectious diseases and of bad hygienic habits. For instance, remote at first sight as the connection may seem, binding together with one link our first and our second childhood, very many of the disabilities of old age are the results of those lightly regarded and almost despised infections, Children's Diseases and Common Colds. It seems ludicrous to think of a grandfather who has not fully recovered from measles, or a great-grandmother who is still suffering from the effects of whooping-cough, but such long delayed Nemeses as these are of painfully frequent occurrence.

It was discovered some years ago by the Royal Commission on Physical Deterioration, appointed by the British government to inquire into the vitality of the

nation, that invariably those annual "crops" of children among whom had raged during their second, third, fourth, or fifth years an unusually severe and widespread epidemic of measles, whooping-cough, scarlatina, and diphtheria were found years afterward to be half an inch to an inch shorter, five to ten pounds lighter, and three quarters of an inch to an inch less in chest girth than children of preceding or succeeding years who had escaped such an epidemic. And this backset in the majority of instances was never recovered from, but the children remained permanently stunted for life.

A healthy first childhood is the best possible insurance for a happy second one. In fact, you may have a full group of senile symptoms and die of old age at forty-five if you are only sufficiently unfortunate in your environment in early childhood and in youth. A large percentage of the mass of humanity, both men and women, do so die old before their time. If you want your child to reach a healthy, happy, uncrippled old age, guard his cradle and his nursery with jealous care against the demons of the Little Fevers of infancy and early childhood. Even the so-called deadening of the old man's senses, the failure of his hearing, the dimming of his eyesight, are due, nine times out of ten, the one to successive attacks of uncured or untreated colds, which spread from his throat up to his Eustachian tube, to his drum and the bones of his middle ear, and the other to that decay of the vitality of the centre of his crystalline lens, under the infections, shocks, overwork, and underfeeding strains of life, which

we call cataract. There is no longer any need in a hygienically intelligent and healthful community that either "all the daughters of music shall be brought low" or that "those that look out of the windows be darkened."

Three quarters of the cripplings of the old man or woman which chain them to their chairs, or make their old bones a torture to them half the night long, are not due to any normal or necessary process connected with growing old or advancing years, but to some form of rheumatism, which is almost invariably an infection, or the result of some form of infectious disease. If you have the good fortune, or the good management, to avoid tonsillitis, influenza, pneumonia, typhoid fever, pus infections, and particularly gonorrhea and syphilis, you will have avoided three-quarters of your risks of stiffened limbs and swollen joints in your declining years, to say nothing of paralysis, heart disease, Bright's disease, cirrhosis of the liver and arterio-sclerosis in adult life and middle age. Of course, as yet, it is not within human power to avoid all, or even a majority, of these maladies and misfortunes, but it is becoming more and more nearly so every day, and the fewer you have of them, the better your chances for escaping these later cripplings and degenerations. Every infectious disease that you can cross off your vital slate means five more chances in the scale of one hundred for a happy and comfortable old age, and this is especially true of those calamities whose avoidance is already in the power of every one, the so-called venereal diseases. The old man may

chuckle in retrospect over the sowing of his wild oats, but his chuckle is apt to change into a groan when its vibrations reach his gonorrhea-crippled elbow, or his smile be twisted in a wry grimace by the failure of the syphilis-paralyzed corner of his mouth to take part in it. The old man's conscience may not worry him much, but nature has other methods of evening up the score.

On the other hand, all the so-called senile changes may be produced at a pitifully premature period and in actual life are so produced with painful frequency, by either underfeeding or overwork at an early age, or by confinement in foul air and without proper exercise. The most potent general cause of old age, in fact, is that delightful combination of all three of these degrading influences, which has been exalted by religion as a means of grace under the title of poverty. If you want to live to a good and comfortable old age, don't be poor. The popular delusion that it is among the poor and lowly that great age is most apt to be attained is simply due to the fact that the poor grow old so soon. The average "centenarian" huddled in the almshouse or sitting in the sun beside his cottage door, though he looks every inch of his one hundred or even hundred and ten years in decrepitude and bodily decay, is usually found on investigation to be under eighty, or else to have no evidence or proof whatever when he was born. He is a hundred, poor old chap, not in years, but in toil and privations and miseries.

Do not let your children be underfed or overworked, whether in the factory or the schoolroom; do not let any one underpay or overwork you and you will have

doubled both their and your chances for a good, cheerful, and enjoyable old age. The poorer and worse fed a nation or a class, the shorter its average life, the fewer those who ever attain to what might be courteously termed a good old age. The Hindu population of India, for instance, has an average longevity of twenty-three years as compared with our own life average of forty-six. Yet they become so old and decrepit at forty and furnish such fit material for the fable-monger and "centurion"-maker that we actually believe that the attainment of a century of life is far commoner among them than in Western lands.

More of us are living to a good old age to-day than ever in any age of the world before, and more probably in America than in any other country in the world on account of the greater and more equally diffused prosperity and comfort of all classes and individuals. The prevention of old age, in the sense of its postponement and of robbing it of most of its discomforts, is advancing steadily. Our popular belief that the attainment of a good old age was far more common in the good old days was simply one of our familiar delusions by the rosy light which shines upon the past. We imagine that very old people were more common, say one hundred years ago, for the childishly ridiculous reason that all the men or women who were born in that period, whom we personally have seen or known, were naturally and in the nature of the case, very old. In fact, the good old ages of the good old days as compared with these degenerate ones are about as mythical as our centenarians.

How almost purely mythical these latter are may be illustrated by one typical instance. There is, or was a few years ago, a pensioner carried on the pension rolls of the United States Government whose age is there set down at the venerable and impressive one of one hundred and nine years. This fact was thrown in my teeth by a devout believer in centenarians, and I accordingly had the old gentleman's record investigated. I found that upon the books of the Pension Bureau were *seven* different statements of the pensioner's age made at different periods when he was applying for increase of pension, no one of which agreed with any of the other six, and was therefore not surprised to find at the bottom of the record that he had been mustered out of the army at the age of forty-three, just forty-three years before, making him, according to his then sworn statement, eighty-six years old instead of one hundred and nine! But this is a trifling discrepancy in centenarians. They do not intend to deceive, they simply do not know or have forgotten, and their imagination plays them tricks.

It is easy to imagine that we shall be unhappy when we are old, and that the old man must chafe against his physical limitations, as we would now were they to descend upon us in the full flush and fire of youth and vigor, just as we imagine that we shall be unwilling to die when the time comes. To put it to the test of experience, think over in your minds the ten, twenty, or thirty people that you know who are well advanced in years, and decide as best you may whether they are

happy, or unhappy. If you find more than one fifth of them in the latter class, it will be unusual.

Another important point upon which our impressions deceive us is that old age, being the period at which life is necessarily approaching its close, is therefore, inevitably, an age of discomforts, of aches and pains, of invalidism and of illness; but the data are very far from supporting this. Take any table of mortality rates at the different ages of life, compare the earliest and latest figures, and the first thing that will strike you will be the almost incredible, but paradoxical, fact, that instead of old age being the cause of the highest mortality, this menace belongs to infancy. The death rate per thousand living during the first year of life, will range anywhere from one hundred and twenty to two hundred and fifty, the average being about one hundred and fifty; while that of the decade from seventy to eighty, is barely half that; and the period from eighty to ninety just about equals it. In other words, we die faster, and have more diseases when we are babies in the cradle, than we do in our second childhood. In fact, the mortality of the aged is scarcely greater than that of the child of ten, or the man of thirty.

One advantage of the second childhood is that measles, whooping cough, chicken pox and the like, have no more terrors for it. The old man is not nearly so liable to die of tuberculosis, or typhoid, of syphilis, of dysentery, or indeed of any of the acute, infectious diseases, except pneumonia and influenza.

Nor are these the only ills of the flesh that his age

has gained him a considerable degree of immunity from. One of the rewards that comes to the veteran nervous system, after the shock and strain of the battle of life, is a curious but distinct balance and poise, which it often did not possess in earlier years. While its actual vigor of attack and powers of endurance are somewhat lessened, it is less liable to be thrown into the pain panic, or be disturbed in its balance. While we take it for granted, with our usual cheerful and consoling logic, that anything which we may have in the way of a bodily weakness, or tendency to infirmity, must necessarily increase with age, it very frequently happens that exactly the reverse is true; and the man who suffered tortures from nervous dyspepsia, or blinding agony from sick headaches, or the throes of suffocation from hay fever, or asthma, in his younger and middle life, may gradually outlive these tendencies, and become entirely free from their attacks in his declining years.

Part of this immunity from acute attacks and severe pain is probably due to the slight dulling and numbing of the keenness of the nerve centres, so that they do not react so violently to insults and irritations. But much of it appears to be of the nature of a genuine toughening against attack, and the later years of life, if less passionate than the earlier, are distinctly more peaceful. This is reflected in their faces, for peacefulness is the dominant note of the expression of the aged.

In fact, by one of those compensations which nature almost invariably provides, the decline of our powers in advancing years is accompanied, and usually well pre-

ceded by, a decline of, or alteration in, the direction of our inclinations. The man of seventy-five, for instance, eats less than does the man of forty; and becomes usually somewhat restricted in the number of foods that he likes, and inclined to avoid the more pungent flavors. But this is simply because his appetite has gently, but imperceptibly, declined as his fuel needs become less; and within the limits of his appetite and his simpler tastes, he enjoys his food almost as keenly, and digests it, on the average, with rather less discomfort than in the maturity of his powers.

The same thing is true in regard to his powers of sleep. He sleeps fewer hours at a time, and probably less during the twenty-four hours than in his younger days — much less, certainly, than the eighteen hours out of twenty-four of babyhood. But this is because he is no longer growing, and does n't need to spend so great an amount of time in this state of blissful sprouting unconsciousness. The sleep that he does take is not so deep, but it rests him; and it is distinctly rare that the old man, or old woman, suffers much discomfort from insomnia.

In fact, a large part of what we are pleased to term the "decline of our powers in old age," is really, broadly considered, a simple adjustment on the part of nature to the conditions of a new situation. The average healthy old man no more repines, or considers himself ill-used, because he cannot work ten hours a day, or throw two hundred pounds over his shoulder, than does the rotund, prosperous business man, that he can no longer "skin the cat," or turn somersaults, *ad libitum*, directly after dinner.

He has borne his share of the burden and heat of the day, has won his honorable discharge and his pension, and can enjoy his well-earned leisure, fighting his battles o'er again, musing over what it was all about, and watching others toil and sweat as he used to. He is in the position of the retired Major in Scott's story, who, in his snug little villa, had his servant wake him every morning at 7.30 with the call, "Time to dress for parade, sir!" just for the pleasure of saying, "D—n the parade!" and turning over and going to sleep again.

As the shrewd old classic proverb has it, "*Tempora mutantur et nos mutamur in illis*" (Times change and we change with them). Nothing but the over-weening conceit of youth, or the hot pride of middle life, could blind us to the fact that the man of later years enjoys himself, within the limits of his new conditions, almost as much as we do in the heyday of our powers; only his enjoyment is of a different kind.

That he is adjusted to his new conditions, and has not simply, so to speak, crawled into a shell of insensibility, or indifference, is shown by the fact, which the progress of modern surgery has strikingly brought out, that his tissues have still an astonishing amount of power of repair. Barring certain violent shocks, and operations involving long and protracted convalescence, old men and old women stand necessary surgical operations surprisingly well; and their tissues, under proper aseptic precautions, heal almost as surely and kindly, although somewhat more slowly than those of the young and middle-aged.

Such diseases as attack old men and women run, as a

rule, a milder course, produce less disturbance, and, with the exception of pneumonia, show almost as high a recovery rate as they do in adults, or in the young.

An amusing illustration of this *bouleversement* in attitude is afforded by the gentle and unconscious tendency of most old men and women — indeed for the matter of that, most middle-aged ones as well — to give themselves airs of moral superiority, and pose as examples of deportment to the young. Having lost the sawmill, famine-like edge of their appetite, for both food and drink, and becoming more moderate and abstemious in their tastes, they are inclined to give themselves great credit for this reform of their habits, and to assure all the rising generation that, if they had only known enough to restrain their appetites when they were young, they would have avoided a great deal of trouble; and to hear them talk, they might have already reached the age of eighty, or eighty-five, instead of seventy.

Now that they have reformed from necessity, they are sure they are going to live to be a hundred, and urge all their young friends and relatives to follow their example. In like fashion, having lost their ability to stay awake late at night, and usually waking up early in the morning, without being able to go to sleep again, they become proud of their habits of early rising and retiring in good season.

If they have been of convivial, or uproarious habits in their youth, they, as a rule, lose the taste for these more exciting and violent pleasures, as well as the strength to indulge in them; and are apt quite

to plume themselves on their wisdom and self-control in abandoning such unprofitable habits.

The quite unnecessary goodness of some of our standards of morality unquestionably comes from the fact that these standards are largely established by the elderly and influential, or the old and venerable. This is one of the reasons why we believe such a lot of morality, and practice so little of it. Certainly, in the physical world, not a few of our most famous and most universally accepted rules of health have been written in, and for, the declining years of life, and extended to, or even forcibly imposed upon, the ascending years. Many, if not most, of the improvements that we would make in our conduct if we could become young and start life over again, would be ridiculous misfits.

There was a delicious topsy-turvy wisdom in Lewis Carroll's "Alice in Wonderland" satire on callow youth eager to profit by the wisdom and example of ripe old age.

"You are old, Father William," the young man said,
"And your hair has become very white,
And yet you so constantly stand on your head,
Do you think at your age it is right?"

"In my youth," Father William replied to his son,
"I feared it might injure the brain
But now that I'm perfectly sure I've got none
Why I do it again and again."

The counsel of old age is very valuable — for the aged; but should always be taken with a large-sized grain of salt by youth. Few things could be more ab-

surd than the despairing pessimism of the French philosopher, "*Si la jeunesse savoit, si la veillage pouvoit*" (If youth only knew, if old age only could). If youth knew, it probably would n't; nor would old age if it could. They would both be better guided by their instincts. Even if youth did, it would probably make quite as many mistakes as improvements, and would lose one of the greatest pleasures in life, and charms of its age — the fun of finding out. Even if old age could, the desires and impulses of youth would be not merely as unbecoming and absurd, but as little attractive and even repugnant to them personally, as the habit of eating green apples, or standing on one's head.

Old age and youth are different. Their conditions are different, their standards different; and to assert that one is happier, or less happy, than the other is irrational — indeed, little short of absurd.

Another thing which has helped to mislead us in regard to the disabilities and discomforts of old age, is that we seldom realize to what a large extent these are, not merely removable, but have already been removed by the progress of modern science. Up to half a century ago, it was an accepted commonplace — an axiom almost — that the vision of the old became dim, their hearing poor; that they were chained to their chair and their fireside by rheumatism; that from the loss of their teeth they were compelled to live upon gruels and paps, and that, what with their dim vision and their poor hearing, and their feeble and tottering gait, unless they could hobble over to the hearthstone of some crony of their own age, they had no means

of keeping in touch with the life about them, and lost all interest in the affairs of the world. But we have changed all that, or most of that, already.

The only important, or frequent, decline of vision which comes with advancing years is that due to the loss of power in the little muscle of accommodation, combined with the loss of elasticity in the lens, preventing the eye from adjusting itself for near vision. This gives rise to the familiar *long-sight* of middle and later years. But this mechanical disability can be entirely overcome for all practical purposes, by mechanical means, namely, the placing of lenses, or spectacles, in front of the eye to do for it what its increasing rigidity renders it unable longer to do for itself. With properly adjusted spectacles, the vision not merely of the elderly and old, but even of the extremely aged, may be made, for all practical working purposes, as good as in youth.

So that, with the wonderful development of the Black Magic of the printer's art, and the flood of well-written and beautifully printed and illustrated books and newspapers and magazines, upon every conceivable subject, and appealing to every possible range of interest, the old man in his well-warmed room, or sunny porch, can have pass in review before him, all the interests, activities, and thoughts of the world, the histories of the past, the excitements of the present, and the adventures and prophecies of the future.

There is no longer the slightest reason to dread that any of us will fail of resources, or be in danger of losing an interest in life when we grow old. The only other

degeneration which often occurs in the eye, the loss of transparency by the crystalline lens, producing the well-known cataract, does not occur in more than a small percentage, even of those who pass their seventieth year; and when it does occur, is susceptible of complete relief by a safe and painless surgical operation.

The same thing is true in an almost equally striking manner in the limitations of diet and impairment of mastication, due to the loss of teeth. Dental science has now reached a pitch where it can make the proud claim that if it be given charge of the teeth in childhood, so as to be able to exercise preventive and protective care over them, it can practically prevent decay of the teeth altogether, or postpone it to a much later period in life, than now customary. If decay has already occurred, so perfect have become the resources of the dental art in the direction of filling and crowning and bridging, that efficiency can be preserved to an almost unlimited degree and period; even if worst comes to worst, a clean sweep can be made of such pitiful remnants as remain, and fair, moderate comfort and good masticating power given with the plate, or full set.

Unfortunately, we still lack a cataract operation for the ear, or a device which will cause sound waves to reach the nerve keyboard of the inner ear, as spectacles will cause the light waves to focus upon the retina. But we have discovered the encouraging fact, that instead of the impairment of hearing of middle life and old age being due to a mere inevitable dulling of the

senses, to some degenerative process in the nerve of hearing due to old age, the overwhelming majority of deafness which we find is due to an inflammatory disease of the middle ear, and the changes which result from this. Successions of neglected bad colds, untreated chronic catarrh, spreading up the tiny Eustachian tube from the back of the throat to the cavity of the ear, thicken the drum and bind together the tiny chain of bones behind it, and thus cause something like ninety per cent of all cases of deafness. It is not old age that causes "all the daughters of music to be brought low," but catarrh.

It is not too much to say that when teeth are kept in perfect condition, and ears and noses kept free from catarrh by pure air and the avoidance of infectious germs, and their diseases promptly treated and cured before they can creep up the Eustachian tube and attack the ear, that, with the boon of spectacles, three fourths of the so-called dimming of the senses of sight, hearing, and taste in old age, will have been done away with.

Even though "the almond-tree shall flourish" and the "strong men bow themselves" and "they shall wake up at the voice of the bird," the sun need not become darkened, nor the "grasshopper become a burden," nor desire fail, nor life ever appear a vanity of vanities. The preacher who chanted that swan-song was — like many another mournful moralist — a reformed rake, who only, in Renan's cynic phrase, became virtuous when he found himself impotent. Only a sadly misspent youth brings this kind of an old age.

The outlook in regard to the various crippling disabilities of old age is almost equally cheering. While there is, unquestionably, loss of power due to actual shrinkage of the muscle cells themselves in old age, and some loss of balancing power, from similar changes in the brain, and particularly the cerebellum, this is a change only in degree, rather than in kind; and the man who through adult and middle life keeps himself in the habit of vigorous, enjoyable, and abundant exercise in the open air, will find that he can continue this in milder forms, and within somewhat more restricted limits until he is seventy-five, eighty, or eighty-five years old. Not a few of the crippling muscular disabilities of old age are due to bad habits and over-confinement, and too much sitting still in middle life.

At the same time, we have found out that the vast majority of the changes in muscles, joints, and bones, which take place in old age are not only gradual and symmetrical, but absolutely painless; and that where actual laming of a joint, or pain in a limb, occurs, these are, nine times out of ten, the result of rheumatism, or some other form of some acute, infectious disease. In other words, most of the positive, and all the painful muscular and locomotor, disabilities of old age are due to diseased conditions. Many of these diseased conditions are already preventable; still more are curable, and all are becoming more so every day. So that the outlook for physical comfort in the later years of life is already excellent and steadily becoming better. Indeed, that most characteristic and fundamental of all

senile degenerative changes, the slow dry decay and hardening of the muscular coat of the arteries, known as *arteriosclerosis*, has recently been found to be chiefly hastened, if not actually largely caused, by two influences, muscular overwork and infectious disease, both of which are in measure avoidable, either by the individual himself, or with the aid of the community and its laws. The pitiful feebleness and decrepitude of the aged laborer are due not to his age, but to the cruel overwork that has wasted his muscles and stiffened his arteries, the diseases of overcrowding and foul air that have burned up his vitality before his prime, the scanty diet and bad food which have undermined his strength and robbed him of resisting power. We cannot prevent the approach of old age, nor even at any time arrest its course, but we can delay its progress and rob it of three fourths of its terrors. Don't work too hard, where you have choice in the matter; live, sleep, and spend plenty of time in play in the open air; avoid in every feasible way exposure to infectious disease; keep a good appetite and gratify it three times a day; keep up your interests and hobbies, especially outdoor ones, and you'll never realize that you're old until after you're dead — and then of course you won't.

In a score of less direct ways modern progress has done much to increase the enjoyableness of the later decades of life. A hundred years ago, for instance, the easiest and swiftest way of travel was by stage coach, and fifty miles a day for five days in succession was about the limit of physical endurance for the strongest and most robust man in the prime of life. Now, any one

who is able to walk the length of his garden unaided, can travel the whole circuit of the globe with comfort and delight. All he has to do is to step from a stationary living-room, dining-room, or bed-room, into a moving one; and he can literally be carried from one end of the country to the other sitting in his easy chair, without discomfort and without fatigue. While to those who are fortunate enough to be able to afford it, the automobile has restored the agility of their lost youth, multiplied ten-fold, like some fabled Seven League Boots. No gruel in the chimney corner for them, while a seat on the Magic Carpet of the twentieth-century motor-car is to be had.

The decade or two after retirement from the more active cares of life, instead of being the decade of confinement to house and garden, with meditation and prayer as its chief resource, has become a decade of travel, of seeing the world, of getting a broader outlook upon life.

Even such a prosaic change as the vast improvements in our method of heating our houses, has liberated old age from many of its shackles. Poets have been fond of describing old men and old women as "chained to the hearth," "living in the chimney corner," "stretching out their thin and gnarled hands to the leaping flames." But this was simply because the chimney corner, or place immediately near the fire, was the only place in the whole house that was decently warm. Even it was warm only on one side. The "old bones that were hard to please" at night, and made sleep a difficulty, owed most of their grumblings to

the fact that the unwarmed, or poorly warmed bedroom, combined with the lessened internal heat production, caused them to be loaded down with not merely oppressive, but almost crippling, weights of blankets and counterpanes.

With the good air indoors, that can only be got where good modern methods of heating are employed, the old man loses half his tendencies to the colds and rheumatic attacks that cripple him, and the pneumonias that may ultimately carry him off. He can sit anywhere that he pleases in the room, or move about all over the house without danger of chilling his old bones; and his tendency to become bent and cramped and stiffened will be diminished more than one-half.

In another way, also, old age is, in these days, relieved from much of its bondage to cold, and the winter's storm, by the possibility of making a change of climate, and following the sun down toward the equator in winter time, at moderate expense and without fatigue, or discomfort. The possibility of wintering in California, or Florida, under even the most modest circumstances, gives a new lease of life to those in declining years. One of these days when we become sufficiently civilized, the possibility of a change of climate in winter for those who have turned their backs upon the sun, will be looked upon not as a luxury, but as a necessary comfort to which they are legitimately entitled, and which will be placed within their reach by the community, or the state.

In short, instead of a disease, the tendency of modern science is more and more to regard old age as, not

merely a necessary, but a normal, painless, and even enjoyable, condition. Like all normal processes, it is not merely painless, but even desirable, when the time comes, like death itself. This is strongly supported by such studies as have been made of the essential character of the changes that take place in old age.

The first thing that stands out with surprising distinctness is that there is nothing new about these changes. That instead of their being limited to, or even beginning definitely at, a certain moderately advanced age of life — forty, fifty, or sixty years— they are a continuation of changes which have been going on steadily from childhood, yes, from birth.

If we are going to do anything to cure the disease of old age, we must begin before birth. Indeed, as Oliver Wendell Holmes wittily remarked on the prevention of disease, "with the grandparents." The so-called senile changes are changes which have been going on ever since we began our individual existence as a fertilized ovum. The time when we begin to feel old, the particular period at which we begin to "show our age," is merely that period at which these internal changes have reached and shown themselves upon the surface, in which, so to speak, these microscopic alterations have finally become visible to the naked eye.

It is nothing short of absurd to say that a man becomes old, or senile, or incapable of further development, or of the conception of new ideas at, or after, any special or particular age. There is no one period of life in which we grow and another in which we decline. Both processes are going on side by side in every part

of our body from the day we are born. Just as the life of the body means the death of certain of its cells, so the growth of every power and faculty means the sacrifice and the decay of others. Every primitive cell of the embryo lays down part of its life to become a muscle-cell, a neurone, a blood-corpuscle or a bone cell. The youngest and pulpiest fibre in a baby's muscle, the most primitive nerve-knot that lays the foundations of the brain, is in and by that process beginning to be old. Division of labor among the cells to form a body, *differentiation*, as the biologists term it, is the livery of death. Only one-celled animals which have no differentiation, are immortal and never grow old. Physical immortality, deathless youth, is possible, but you must be an infusorian or a yeast-plant to attain it, and one would n't even be a clam or a jelly-fish for the price.

The process has no limits any more than it has beginnings. Life is just that, one third dying that two thirds may live, whether it be the single cell, or the hugest and most elaborate body. While in such gross matters as mere avoirdupois and stature, and the actual horse-power of our muscles, we reach a limit, a period of what we are pleased to call maturity, at a comparatively early age, yet in other and more important respects we continue to grow and develop steadily, to a very much later period—fifty-five, sixty, and even seventy years. New and valuable achievements, masterpieces in every realm of human activity and interest, have been produced hundreds of times in every decade, up to and including the ninth.

Indeed careful studies and measurements have shown that our time of actual maturity and arrest of growth in physical characters, such as height, weight, and chest girth, is much later than formerly supposed; and instead of reaching, as was at one time confidently stated, our full height at eighteen, our full strength at twenty-three, and our full chest girth at twenty-five, as a matter of fact, we continue to increase, slowly, it is true, but definitely, in all these respects until thirty-five, thirty-eight, and even forty years of age.

It is obvious then that there is no hard and fast "dead line" which can possibly be drawn, beyond which no further growth, or fresh creative effort, or new enterprise, or improvement, is possible. In fact, by living a healthful, active, happy life, and keeping up all our interests, we can grow and develop and adjust ourselves, and feel that we are growing, until we are one day suddenly dead, without ever realizing in any distressing or painful way that we are growing old at all.

Indeed, old age has already gone quite out of fashion. The civilized, educated man or woman of seventy is younger than the savage of forty or the peasant of fifty. What with steady spread of regular vacations and country or surburban homes, and walking clubs and golf and gardens and automobiling and travel of all sorts, those who would once have been considered old, are now only seventy or seventy-five years young.

Not only is there no definite period in adult or later life when these so-called senile changes begin, but there

is no period at which they become accelerated or start to progress at a more rapid rate than before. In fact, the extraordinary paradox exists that what we term old age, is the time of life in which we are growing old *least* rapidly. The only thing that makes it appear otherwise is that we have been steadily growing old all our lives long, and the thousand imperceptible accumulations have mounted to a height that we can recognize.

It was only within the last quarter of a century that we actually sat down to quietly and rationally discover in just what this loss of youth consisted, and at what period any steps for its relief must be taken. Few things are more amusing — I had almost said infantile — in the history of the human mind than the eagerness with which we have seized upon one straw discovery after another of the cause of old age; or even of the special change which constituted old age, and the prevention of which would abolish, or arrest, it. At first it was supposed to be certain arresting and calcifying changes in the bones; and a variety of bone-building foods were recommended which would prolong youth indefinitely. Then it was certain changes in the muscles, or the wasting away of certain cells in the brain, or that curious decay and stiffening of the muscles in the walls of the heart and blood vessels, known as *arteriosclerosis*, which gave rise to the familiar proverb, "A man is as old as his arteries"; and which was *the* underlying process of old age.

Then almost every organ of the body was taken up in turn, and separately accused of being the criminal

that, by its premature decay, poisoned the rest of the system, and produced old age. Particularly was this the case with those organs of whose use and function we were still ignorant, and which, therefore, left limitless room for speculation without risk of successful contradiction, such as the thyroid gland, the suprarenal body, the thymus gland, and even the tonsil, or appendix.

As our knowledge of the body, and means of its more elaborate study, increased, our guesses became more profound and complicated, but scarcely more rational. Metchnikoff discovers that at a certain stage in the process of decay, a form of large white blood corpuscles, which he terms *macrophages*, appear in the organs that are undergoing senile decay, and proceed to attack and devour their substance. For instance, they attack the pigment, or coloring matter, in the shafts of the hair, and thus produce the familiar blanching, or graying, of old age. Whereupon he announces that these deadly and treacherous macrophages are the real causes of old age and all its disabilities.

Going a step further, he discovers that what appears to endow these macrophages with their murderous tastes and powers, is putrefaction in the intestines due to the presence of bacteria. The region which contains most billions upon billions of bacteria is the lower section of the bowel, known as the large intestine, therefore this large intestine, with the putrefactions which take place in it, is the cause of old age.

At first he was content to endeavor to diminish these

putrefactions, by the administration of sour milk, on the theory that the lactic acid produced in sour milk had the power of checking the growth of putrefactive bacteria. So far his position had been pure and harmless theory, and he needed some point at which his rainbow could rest upon the earth; and was fortunate enough to find it.

Happening to spend a couple of summer vacations in the Caucasus Mountains, he discovered two startling facts, that in the tiny hamlets which dotted the glens and the passes, there were large numbers of very old-looking people, many of whom claimed to be centenarians; and the inhabitants of these same villages used large quantities of sour goat's milk. Nothing, of course, could be clearer than that the sour goat's milk caused the centenarian; and a new cure for old age was discovered, and proudly proclaimed, namely, sour milk and clabber cheese.

Of course, it was quickly pointed out that sour milk and cottage cheese were articles in common household use all over the civilized and uncivilized world; and that many peoples who were most addicted to them reached the mature average longevity of a little over twenty years; that the alleged centenarians of the Caucasus had, like most other centenarians, no proof of their real age; that there was no proof that the swarms of bacteria in the large intestine were in any way injurious to the system, or had any connection whatever with the macrophage, or that the most murderous macrophage could make the slightest impression upon young and vigorous tissues and organs.

Furthermore, laboratory tests showed that the bactericidal power of lactic acid was of the mildest and feeblest, and that sweet milk would produce almost the same amount of lessening of the number of bacteria in the large intestine as the best imported Bulgarian bacilli. We have all been, more or less, on the sweet-milk treatment from a very early age.

But something must be done to save the theory, and therefore, casting aside the splintered remains of his lactic acid spear, he boldly attacked the entire large intestine with a club, figuratively speaking, demanding its utter and complete annihilation and removal from the body. A few eager-eyed seekers after health and immortality, and followers of the new fads, submitted themselves, or their patients, to this wholesale amputation; but the results were not entirely satisfactory. Although the new Immortals would, unquestionably, have lived to be very old — if they had survived the operation — a good many of them were inconsiderate enough not to do this; and at least two thirds of the survivors were left in such condition that they wished they had not. But still, there will doubtless be an eager jump for the next "Sure Cure for Old Age."

In fact, all these explanations and cures have shared the same fate, namely, that the single changes in separate tissues, or organs, upon which they depended, were all found to be merely local expressions of the general process of degeneration which was going on all through the tissues. All the changes that caused old age were merely symptoms of the process itself, like the whitening of the hair, and the shrinking of the gums. Not

only would no one of them alone produce old age, but the arrest, or cure, of no one of them alone would prevent it.

Careful post-mortem examinations of the bodies of those dead of old age showed hundreds of cases of perfectly soft, elastic arteries, of normal thyroids and suprarenals, of unblanched hair, of undecayed teeth, of unwasted bone, and unatrophied muscles. And yet the curtain had fallen upon the final scene, nevertheless.

For many centuries we contented ourselves with the superficial belief that the changes which produce old age were something which began in, and were peculiar to, middle or later life, and therefore, with childish naïveté, we were confident that something could be done, or would one day be discovered, which if applied at this time of life would do something to arrest them, and prevent old age; or even with flatulent absurdity and credulity, restore our youth. All literature and legend are full of eager, pathetic quests for some fabled Fountain of Eternal Youth. Indeed, the discovery of the Mississippi River and the best part of our country, was due to such a search.

The only things that need make us dread old age are poverty or disease. Both of these are preventable, and in the process of prevention. The man or woman who in seventy honest, hard-working years has not rendered the world abundant service to justify an honorable retirement, with a liberal support, is a *rara avis* indeed. That the conscience of the community is already awake to the inestimable debt which it owes the veterans of life's battles, who have created its pros-

perity and made its very existence possible, is already shown by the almost world-wide establishment of schemes for old-age pensions, though these ought not to be necessary in a community where every man is given his fair share of the wealth that his hands and his brain have produced. We pay millions upon millions every year, without stint or grudge, to pension in their declining years our old soldiers, those who offered their lives and shed their blood for their country. But every worker who is enlisted in the great industrial army of servants of the common good, he too has not merely offered but spent his life, aye, and shed his blood in our service. For us his back was bowed, his muscles stiffened, his brow furrowed with anxiety and carking care, his hands calloused and gnarled. It is only the dull scales of use and wont over our eyes, only his every-day commonness and frequency, that blinds us to the heroic aspect of the patient, pathetic figure of the aged toiler, who has faced every day and every year of his life, in mine, in blast-furnace, in factory, in yard and siding, risks as deadly as any upon the field of battle. As Kipling, in his splendid hymn to labor, sings:

> "Pierce ye the mountains, bridge the flood,"
> Make ye the path more broad and flat,
> Nay, it is black already with blood
> Some Son of Martha shed for that.
>
> "Early at dawn ere men see clear,
> They stumble into Death's terrible stall
> And lead him forth like a haltered steer,
> And turn him and goad him till evenfall."

Not for himself, but for the Life of the Race, for bread

and shelter for his wife and little ones. And the woman who works, whether in the home or outside it, she too has worn out her powers, has spent her all for the service of the race. She too has offered her life and shed her blood to bring into the world the new generation. There has been more blood shed in the birth-chamber than ever upon the field of battle, ye who would belittle woman because she cannot offer her life in defense of her country! Never can the race repay the debt it owes to the aged nor will it refuse gladly and proudly to acknowledge it.

Every man is entitled to live as long as he can live usefully, wholesomely, and happily. Whenever he reaches the point where he feels he can no longer do either, he has the right to hand in his resignation and depart in peace without censure and without reproach. Though the advancing years bring us nearer death, this adds not one iota to their terrors. As in youth there is an instinct for life, in old age there is an instinct for death; and all develop it who live long enough.

Though the thought of death falling like a shadow across our path, chills and repels us in the flush of youth or the hot noon of manhood's prime, there is a time to die as well as a time to live. Work-worn and pain-weary men and women stretch out their arms to the Great Rest-Bringer and long for death, as little children cry for sleep at eventide. Death is a peaceful ceasing to be, far less strenuous than birth, painless, natural, like the fading of a flower or the falling of a leaf.

The physician sees scores and hundreds of men and women in the Valley of the Shadow, and rarely, very rarely, one who is afraid or even keenly unwilling to die when the time comes. That men are afraid to die when their time comes, is one of the many slanders upon humanity by superstition and its priests. When Death comes near enough so that we can see the kindly eyes behind the mask, his face becomes as welcome as that of his twin-brother, Sleep.

THE END

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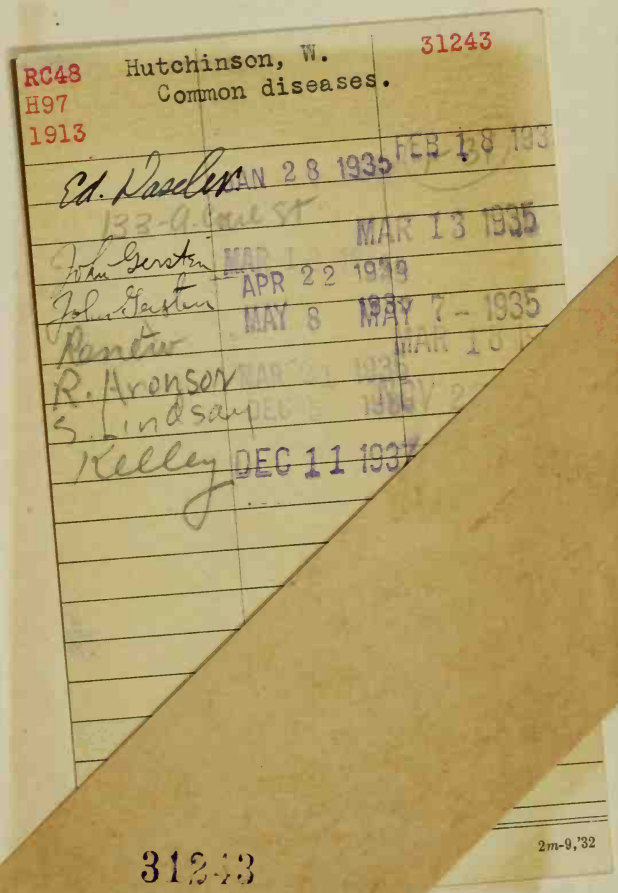

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